

# Output FOM Institute AMOLF 2014

## Nanophotonics

NanoOptics	Kobus Kuipers
Photonic Materials	Albert Polman
Surface Photonics	Jaime Gómez Rivas
Resonant Nanophotonics	Femius Koenderink
Photonic Forces	Ewold Verhagen
Hybrid Solar Cells	Bruno Ehrler

## Molecular Biophysics

Ultrafast Spectroscopy	Huib Bakker
Bio Imaging MS	Ron Heeren
Biomolecular Photonics	Yves Rezus
Nanoscale Solar Cells	Erik Garnett
Nanoscale Biophysics	Vinod Subramaniam
Mechanical Metamaterials	Martin van Hecke

## Systems Biophysics

Biological Soft Matter	Gijsje Koenderink
Theory of Biomolecular Matter	Bela Mulder
Biochemical Networks	Pieter Rein ten Wolde
Biophysics	Sander Tans
Systems Biology	Tom Shimizu
Quantitative Developmental Biology	Jeroen van Zon

Peer reviewed Publications	120
Publications in proceedings or other journals	15
Contributions to scientific books (chapters or entire book )	9
PhD theses	14
Open Access publications	135
Invited lectures, posters, awards and other activities	85
Other lectures and posters at (international) conferences and other (scientific) meetings	292
Awards and recognitions	12
Patents	-
Performances on television, radio or at public events	6
Publications in public magazines, newspapers or on the internet	20
Other professional products (software, prototypes, etc.)	6



## Group L. Kuipers 2014

### Fundings

FOM-Projectruimte (PR)  
 FOM-Program Nanoscale Quantum Optics (NQO)  
 FOM-Program Plasmonics (PLSM)  
 FOM-Philips IPP Nanophotonics for Solid State Lighting (NSL)  
 NanoNextNL Program 6B Functional Nanophotonics (NN6B)  
 Smartfix Program MEMPHIS (MEMPHIS)  
 EU FET STREP - SPANGLAQ (S4Q)  
 ERC Advanced Grant (ERC)

### Employees

Lorenzo de Angelis (OIO)	ERC
Boris le Feber (OIO)	PR
Anouk de Hoogh (OIO)	NQO
Dolfine Kusters (stagiair)	-
Aron Opheij (OIO)	MEMPHIS
Nir Rotenberg (PD)	SQ4
Ruben van der Wel (OIO)	NN6B
Matthias Wulf (OIO)	PLSM

## 1. Academic publications

### a. Peer reviewed Publications

1. N. Rotenberg, L. Kuipers, *Mapping nanoscale light fields*, Nature Photon. **8**, 919–926 (2014).
2. A. de Hoogh, N. Rotenberg, L. Kuipers, *Optical singularities in plasmonic fields near single subwavelength holes*, J. Opt. **16**, 114004 (2014).
3. M. Wulf, A. de Hoogh, N. Rotenberg, L. Kuipers, *Ultrafast plasmonics on gold nanowires : confinement, dispersion, and pulse propagation*, ACS Photon. **1**, 1173–1180 (2014).
4. P. Venugopalan, Q. Zhang, X. Li, L. Kuipers, M. Gu, *Focusing dual-wavelength surface plasmons to the same focal plane by a far-field plasmonic lens*, Opt. Lett. **39**, 5744–5747 (2014).
5. F. van Beijnum, A.S. Meeussen, C. Rétif, M.P. van Exter, *Rayleigh scattering of surface plasmons by sub-wavelength holes*, Opt. Express **22**, 10317–10331 (2014).

6. B. le Feber, N. Rotenberg, D. van Oosten, L. Kuipers, *Modal symmetries at the nanoscale : a route towards a complete vectorial near-field mapping*, *Opt. Lett.* **39**, 2802-2805 (2014).
7. L. Kuipers, *Optical Physics : Scattering in focus*, *Nature Photon.* **8**, 9-10 (2014).
8. B. le Feber, N. Rotenberg, D.M. Beggs, L. Kuipers, *Simultaneous measurement of nanoscale electric and magnetic optical fields*, *Nature Photon.* **8**, 43-46 (2014).

**b. Publications in proceedings or other journals**

**c. Contributions to scientific books (chapters or entire book)**

**d. PhD theses**

**e. Open Access publications**

**2. 2. Invited lectures, posters, awards and other activities**

**a. Invited lectures at international conferences and meetings**

1. N. Rotenberg, B. le Feber, F.J. García de Abajo, L. Kuipers, *Electromagnetic near-fields: from optical response to microscopy*, SPIE Photonics West, San Francisco, USA, February 1-6, 2014.
2. L. Kuipers, *Don't forget the magnetic field*, 13th CUDOS Workshop, San Remo, Australia, February 10-13, 2014.
3. L. Kuipers, *Mapping (slow) light at the nanoscale – don't forget the magnetic field*, CLEO 2014, San Jose, USA, June 8-13, 2014.
4. L. Kuipers, *Nonlinear evolution of slow light pulses*, SPIE Optics + Photonics, San Diego, USA, August 17-21, 2014.
5. L. Kuipers, *Simultaneous detection of nanoscale electric and magnetic fields*, SPIE Optics + Photonics, San Diego, USA, August 17-21, 2014.
6. L. Kuipers, *Mapping nanoscale vector fields, electric and magnetic*, NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
7. L. Kuipers, *Mapping the nanoscale structure of light*, IMPRS Physics of Light Annual Meeting 2014, Egloffstein, Germany, September 22-27, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. M. Wulf, C. Husko, B.J. Eggleton, L. Kuipers, *Observing soliton fission in a photonic crystal waveguide* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. A. de Hoogh, A. Opheij, N. Rotenberg, L. Kuipers, *Harmonic generation in plasmonic nanowires* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
3. R.E.C. van der Wel, C. Liu, N. Rotenberg, A. di Falco, A. Fratilocchi, T.F. Krauss, L. Kuipers, *Optical rogue waves in chaotic photonic crystal cavities* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
4. B. le Feber, N. Rotenberg, D.M. Beggs, L. Kuipers, *Polarization state controlled injection of light into a photonic crystal waveguide shows its potential for encoding quantum dot spin to photon directionality* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
5. C. Husko, M. Wulf, S. Combrie, A. de Rossi, L. Kuipers, B.J. Eggleton, *Soliton fission in nanophotonic waveguides unveiled by near-field measurements* (poster), 13th CUDOS Workshop, San Remo, Australia, February 10-13, 2014.
6. L. Kuipers, *Ultrafast optical control at the nanoscale*, TNO, Delft, the Netherlands, May 15, 2014.
7. C. Husko, M. Wulf, S. Combrie, A. de Rossi, L. Kuipers, B.J. Eggleton, *Near-field measurements of soliton fission in nanophotonic waveguides* (talk), CLEO 2014, San Jose, USA, June 8-13, 2014.
8. C. Husko, M. Wulf, S. Combrie, A. de Rossi, L. Kuipers, B.J. Eggleton, *Near-field measurements of soliton fission in nanophotonic waveguides* (talk), OSA Nonlinear Photonics, Barcelona, Spain, July 27-31, 2014.
9. N. Rotenberg, B. le Feber, T.D. Visser, L. Kuipers, *Singularities in optical near fields: tracing the structure of light* (talk), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
10. M. Wulf, C. Husko, S. Combrie, A. de Rossi, B.J. Eggleton, L. Kuipers, *Soliton fission revealed by time-resolved near-field microscopy* (talk), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
11. N.D. Kusters, A. de Hoogh, H. Acar, H. Zeijlemaker, L. Kuipers, *Optical activity of chiral plasmonic nanohelices* (talk), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.

- 4, 2014.
12. B. le Feber, N. Rotenberg, L. Kuipers, *On-chip emitter-spin to photonic path conversion; a Maxwellian feasibility study* (poster), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
  13. A. de Hoogh, N. Rotenberg, L. Kuipers, *Optical singularities in plasmonic fields near single subwavelength holes* (poster), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
  14. A. de Hoogh, A. Opheij, N. Rotenberg, L. Kuipers, *Harmonic generation in plasmonic nanowires* (poster), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
  15. R.E.C. van der Wel, C. Liu, N. Rotenberg, A. di Falco, A. Fratlocchi, T.F. Krauss, L. Kuipers, *Optical rogue waves at the nanoscale in chaotic photonic crystal cavities* (poster), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
  16. M. Wulf, A. de Hoogh, N. Rotenberg, L. Kuipers, *Ultrafast plasmonics on gold nanowires* (poster), NFO-13, Salt Lake City, USA, August 31-September 4, 2014.
  17. B. le Feber, N. Rotenberg, L. Kuipers, *Nanophotonic control of circular dipole emission* (talk), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
  18. M. Wulf, C. Husko, S. Combrie, A. de Rossi, B.J. Eggleton, L. Kuipers, *Soliton fission revealed by time-resolved near-field microscopy* (talk), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
  19. A. de Hoogh, N. Rotenberg, L. Kuipers, *Optical singularities in plasmonic fields near single subwavelength holes* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
  20. A. de Hoogh, A. Opheij, N. Rotenberg, L. Kuipers, *Harmonic generation in plasmonic nanowires* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
  21. R.E.C. van der Wel, C. Liu, N. Rotenberg, A. di Falco, A. Fratlocchi, T.F. Krauss, L. Kuipers, *Optical rogue waves at the nanoscale in chaotic photonic crystal cavities* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
  22. M. Wulf, A. de Hoogh, N. Rotenberg, L. Kuipers, *Ultrafast plasmonics on gold nanowires* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
  23. B. le Feber, N. Rotenberg, L. Kuipers, *Dipole helicity directs photons on-chip: A scalable solid-state to flying-qubit interface* (poster), NanoCity, Utrecht, the Netherlands, October

27-28, 2014.

24. R.E.C. van der Wel, C. Liu, N. Rotenberg, A. di Falco, A. Fratalocchi, T.F. Krauss, L. Kuipers, *Optical rogue waves at the nanoscale in chaotic photonic crystal cavities* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.

### **c. Awards and recognitions**

1. A. de Hoogh, 2nd poster prize at the NFO-13, Salt Lake City, USA.
2. A. de Hoogh, 1st poster prize at the NNV-AMO 2014, Lunteren, the Netherlands.

### **d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. L. Kuipers, Head of the Center for Nanophotonics (AMOLF).
2. L. Kuipers, Chair, Nanophysics Advisory board of FOM, 2011-present.
3. L. Kuipers, Member, Directive Board of LENS (Florence, Italy), 2013-present.
4. L. Kuipers, Member, Oversight Board of EPSRC Electromagnetic Metamaterials Centre for Doctoral Training (Exeter, UK), 2013-present.
5. L. Kuipers, International Partner Investigator of CUDOS (Australia), 2008-present.
6. L. Kuipers, Member of the international steering committee, Surface Plasmon Photonics conference series.
7. L. Kuipers, Programme committee memberships: CLEO 2014, SPIE Photonics 2014, NFO-13 2014.
8. L. Kuipers, Board member, Physics advisory board, Lorentz Center, 2014-present.
9. L. Kuipers, Chair, Dutch committee of the International Year of Light 2015.

## **3. Knowledge transfer (societal and economic)**

### **a. Patents**

### **b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

**c. Performances on television, radio or at public events**

1. Interview for “Witter dan wit”, by Pepijn van der Gulden, Volkskrant 29 November 2014, katern Sir Edmund, p. 48-49.
2. Frascati Employees day-out, Public Lecture “NanoOptica”, AMOLF, Amsterdam, NL, 28 August 2014.
3. ZomerExpo 2014, Public Lecture “Licht zichtbaar gemaakt”, Gemeentemuseum Den Haag, Den Haag, NL, 5 July 2014.
4. Nano Diode video clip, June 23, 2014, [www.nanodiode.eu/news/nano-clip-kobus-kuipers/](http://www.nanodiode.eu/news/nano-clip-kobus-kuipers/)

**d. Publications in public magazines, newspapers or on the internet**

1. Contributed to Physical Review Focus article “Cutting Losses by Surface Light” by Michael Schriber, on the paper “Anomalous Light Absorption around Subwavelength Apertures in metal films” by P. Lalanne and co-workers;  
<http://physics.aps.org/articles/v7/52>

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

**Group A. Polman 2014****Fundings**

FOM-Program Nanophotovoltaics (NPV)

NanoNextNL Program 6D Nanophotonic Devices (NN6D)

NanoNextNL Program 9A Nano-Inspection and Characterization (NN9A)

ERC Advanced Grant (ERC)

Global Energy and Climate Project (GCEP)

Roadmap nanofabrication for photovoltaics (ASML)

**Employees**

Benjamin Brenny (OIO)	NN6D
Toon Coenen (OIO)	NN9A
Jorik van de Groep (OIO)	NPV/ERC
Marie Anne van de Haar (OIO)	ERC
Mark Knight (PD)	GCEP
Claire van Lare (OIO)	NPV
Ruben Maas (OIO)	ERC
Bonna Newman (PD)	ASML
Pierpaolo Spinelli (OIO)	NPV
Rutger Thijssen (OIO)	ERC

**1. Academic publications****a. Peer reviewed Publications**

1. M.T. Sheldon, J. van de Groep, A.M. Brown, A. Polman, H.A. Atwater, *Plasmoelectric potentials in metal nanostructures*, *Science* **346**, 828-831 (2014).
2. M.A. van de Haar, R. Maas, A.H. Schokker, A. Polman, *Experimental realization of a polarization-independent ultraviolet/visible coaxial plasmonic metamaterial*, *Nano Lett.* **14**, 6356-6360 (2014).
3. R. Thijssen, T.J. Kippenberg, A. Polman, E. Verhagen, *Parallel transduction of nanomechanical motion using plasmonic resonators*, *ACS Photon.* **1**, 1181-1188 (2014).
4. A. Mohtashami, T. Coenen, A. Antoncetti, A. Polman, A.F. Koenderink, *Nanoscale excitation mapping of plasmonic patch antennas*, *ACS Photon.* **1**, 1134-1143 (2014).
5. R. Maas, E. Verhagen, J. Parsons, A. Polman, *Negative refractive index and higher-order harmonics in layered metallodielectric optical metamaterials*, *ACS Photon.* **1**, 670-676 (2014).

6. T. Coenen, A. Polman, *Optical properties of single plasmonic holes probed with local electron beam excitation*, ACS Nano **8**, 7350-7358 (2014).
7. B.J.M. Brenny, T. Coenen, A. Polman, *Quantifying coherent and incoherent cathodoluminescence in semiconductors and metals*, J. Appl. Phys. **115**, 244307 1-7 (2014).
8. F. Bernal Arango, T. Coenen, A.F. Koenderink, *Underpinning hybridization intuition for complex antennas by magnetoelectric quadrupolar polarizability retrieval*, ACS Photon. **1**, 444-453 (2014).
9. P. Spinelli, A. Polman, *Light Trapping in Thin Crystalline Si Solar Cells Using Surface Mie Scatterers*, IEEE J. Photovoltaics **4**, 554-559 (2014).
10. T. Coenen, F. Bernal Arango, A.F. Koenderink, A. Polman, *Directional emission from a single plasmonic scatterer*, Nature Commun. **5**, 3250 1-5 (2014).

#### **b. Publications in proceedings or other journals**

1. *Physicazing 2014: Efficiëntere zonnecellen dankzij nanofotonisch ontwerp*, Nederlands Tijdschrift voor Natuurkunde **80**, 144 (2014).

#### **c. Contributions to scientific books (chapters or entire book)**

#### **d. PhD theses**

1. T. Coenen, *Angle-resolved cathodoluminescence nanoscopy*, University of Amsterdam, May 15, 2014.
2. R. Thijssen, *Plasmonic nanomechanical transduction*, University of Amsterdam, September 4, 2014.
3. M.C. van Lare, *Light-trapping in thin-film solar cells using dielectric and metallic nanostructures*, University of Amsterdam, October 7, 2014.

#### **e. Open Access publications**

#### **2. Invited lectures, posters, awards and other activities**

#### **a. Invited lectures at international conferences and meetings**

1. A. Polman, *Angle-resolved cathodoluminescence imaging spectroscopy*, MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.

2. A. Polman, *Resonant dielectric and plasmonic nanocavities for high-efficiency solar cells*, MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
3. A. Polman, *High-efficiency photovoltaics by nanophotonic design*, Workshop From Sunlight to Fuels – Novel Materials and Processes for Photovoltaic and (Photo)Catalytic Applications, Bad Honnef, Germany, May 11-16, 2014.
4. A. Polman, *Dielectric metasurfaces for ultra-high efficiency photovoltaics*, META'14, Singapore, Singapore, May 20-23, 2014.
5. J. van de Groep, *Deep-subwavelength cathodoluminescence imaging spectroscopy of electric and magnetic modes in single silicon resonators*, META'14, Singapore, Singapore, May 20-23, 2014.
6. B.K. Newman, *Light management for ultra-high efficiency photovoltaics*, IEEE PV Conference, Denver, USA, June 9-13, 2014.
7. A. Polman, *High-efficiency photovoltaics by nanophotonic design*, International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.
8. A. Polman, *High-efficiency photovoltaics by nanophotonic design*, Joint EPS-SIF International School on Energy 2014, Varenna, Italy, July 17-23, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. R. Maas, J. Parsons, E. Verhagen, A. Polman, *Higher harmonics in negative refractive index metamaterials* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. R. Thijssen, E. Verhagen, T.J. Kippenberg, A. Polman, *Plasmonics in motion: plasmon nanomechanical coupling for nanoscale transduction* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
3. J. van de Groep, M.T. Sheldon, A.M. Brown, A. Polman, H.A. Atwater, *Plasmoelectric potentials in metal nanostructures* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
4. T. Coenen, B.J.M. Brenny, A. Polman, *E-beam Induced Coherent & Incoherent Processes in Semiconductors and Metals* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.

5. A. Mohtashami, T. Coenen, A.F. Koenderink, *Investigation of resonant modes in plasmonic patch antennas* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
6. M.A. van de Haar, A.H. Schokker, J. Parsons, R. Maas, A. Polman, *Experimental realization of a coaxial plasmonic metamaterial at visible/UV frequencies* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
7. P. Spinelli, M.C. van Lare, B.K. Newman, F. Lenzmann, M.A. Verschuuren, A. Polman, *Light trapping in thin-film solar cells using nanoscatterers* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
8. A. Polman, *High-efficiency solar cells by nanophotonic design* (talk), Chalmers University, Gothenburg, Sweden, January 28, 2014.
9. B.J.M. Brenny, T. Coenen, A. Polman, *Probing coherent and incoherent cathodoluminescence radiation from semiconductors and metals* (talk), MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
10. M.C. van Lare, G. Yin, F. Lenzmann, M. Schmid, A. Polman, *Light trapping in thin-film a-Si:H and CIGSe solar cells* (talk), MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
11. P. Spinelli, J. van de Groep, F. Lenzmann, B. Macco, W.M.M. Kessels, A. Polman, *Practical aspects of integration of Mie nanoscatterers into c-Si solar cells and modules* (poster), MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
12. A. Polman, *Angle-resolved cathodoluminescence imaging spectroscopy* (talk), California Institute of Technology, California, USA, May 2, 2014.
13. T. Coenen, F. Bernal Arango, A.F. Koenderink, A. Polman, *Directional Emission from a Single Plasmonic Scatterer* (poster), EBSN, Amsterdam, the Netherlands, June 2-4, 2014.
14. T. Coenen, D.T. Schoen, B.J.M. Brenny, S.R.K. Rodriguez, S.A. Mann, A. Polman, M.L. Brongersma, *Locally-induced coupling in a plasmonic metamolecule* (poster), EBSN, Amsterdam, the Netherlands, June 2-4, 2014.
15. B.J.M. Brenny, T. Coenen, A. Polman, *Separating coherent & incoherent radiation using angle-resolved cathodoluminescence spectroscopy* (poster), EBSN, Amsterdam, the Netherlands, June 2-4, 2014.

16. J. van de Groep, D.M. Gupta, M.A. Verschuuren, M.M. Wienk, R.A.J. Janssen, A. Polman, *Silver nanowire networks as transparent electrode for polymer solar cells* (poster), Gordon Research Conference on Plasmonics, Newry, USA, July 7-10, 2014.
17. R. Maas, E. Verhagen, J. Parsons, A. Polman, *Negative refractive index and higher order harmonics in multilayer metal-dielectric metamaterials* (poster), Gordon Research Conference on Plasmonics, Newry, USA, July 7-10, 2014.
18. R. Thijssen, E. Verhagen, T.J. Kippenberg, A. Polman, *Plasmonic nanomechanical transducers* (poster), Julius Springer Forum on Applied Physics 2014, Amsterdam, the Netherlands, September 1, 2014.
19. M.A. van de Haar, A.H. Schokker, R. Maas, A. Polman, *Experimental realization of a coaxial plasmonic metamaterial at visible/UV frequencies* (poster), Julius Springer Forum on Applied Physics 2014, Amsterdam, the Netherlands, September 1, 2014.
20. T. Coenen, B.J.M. Brenny, E.J.R. Vesseur, A. Polman, *Angle-resolved Cathodoluminescence Imaging Spectroscopy* (poster), IMC 2014, Prague, Czech Republic, September 7-12, 2014.
21. P. Spinelli, F. Lenzmann, A. Weeber, A. Polman, *Effect of Module Encapsulation on Light Trapping Nanostructures for c-Si Solar Cells* (talk), 29th EUPVSEC, Amsterdam, the Netherlands, September 22-26, 2014.
22. P. Spinelli, M. Knight, A. Polman, *Light trapping in thin crystalline silicon solar cells using Mie nanoscatterers* (poster), 29th EUPVSEC, Amsterdam, the Netherlands, September 22-26, 2014.
23. M.C. van Lare, G. Yin, F. Lenzmann, M. Schmid, A. Polman, *Dielectric light trapping patterns for thin-film a-Si:H and CIGSe solar cells* (poster), 29th EUPVSEC, Amsterdam, the Netherlands, September 22-26, 2014.
24. J. van de Groep, M.T. Sheldon, A.M. Brown, A. Polman, H.A. Atwater, *Plasmoelectric potentials in metal nanostructures* (talk), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
25. J. van de Groep, D.M. Gupta, M.A. Verschuuren, M.M. Wienk, R.A.J. Janssen, A. Polman, *Silver nanowire networks as transparent electrode for polymer solar cells* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
26. P. Spinelli, J. van de Groep, F. Lenzmann, M.A. Verschuuren, A. Polman, *Practical aspects of integration of Mie nanoscatterers into crystalline Si solar modules* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.

27. M.C. van Lare, G. Yin, F. Lenzmann, M. Schmid, A. Polman, *Dielectric light trapping patterns for thin-film a-Si:H and CIGSe solar cells* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
28. R. Thijssen, T.J. Kippenberg, A. Polman, E. Verhagen, *Plasmonic dimer antenna nanomechanical transducers* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
29. M.A. van de Haar, A.H. Schokker, R. Maas, A. Polman, *Experimental realization of a coaxial plasmonic metamaterial at visible/UV frequencies* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
30. T. Coenen, F. Bernal Arango, A.F. Koenderink, A. Polman, *Directional Emission from a Single Plasmonic Scatterer* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
31. R. Maas, E. Verhagen, J. Parsons, A. Polman, *Negative refractive index and higher order harmonics in multilayer metal-dielectric metamaterials* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
32. B.J.M. Brenny, T. Coenen, A. Polman, *Quantifying coherent and incoherent cathodoluminescence in semiconductors and metals* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
33. A. Polman, *High-efficiency solar cells by nanophotonic design* (talk), Sunday Conference, Arnhem, the Netherlands, November 19, 2014.

### **c. Awards and recognitions**

1. A. Polman, Physica Award, Netherlands Physical Society.
2. A. Polman, Innovation and Materials Characterization Award, Materials Research Society.
3. A. Polman, Julius Springer Prize in Applied Physics.
4. M.C. van Lare, Solar Thesis Award for the best Dutch Ph.D. thesis in solar energy.

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. A. Polman, Member, Scientific Advisory Council Advanced Research Center for Nanolithography.
2. A. Polman, Chair, Awards Committee, Materials Research Society (MRS).
3. A. Polman, Member, Royal Netherlands Academy of Arts and Sciences (KNAW) new member selection jury.
4. A. Polman, Chair, FOM Materials Science Advisory Committee.
5. A. Polman, Member, FOM Committee Evaluation Industrial Partnership Programs.
6. A. Polman, Member, Program Committee, NanoCity National Nanoscience and Technology Conference.
7. A. Polman, Co-chair, Workshop Electron Beam Spectroscopy for Nanophotonics (EBSN), Amsterdam, June 2-4, 2014.
8. A. Polman, Member, KNAW Committee National policy for use of intellectual property.
9. A. Polman, Member, Executive Board National Nano-initiative NanoNextNL.
10. A. Polman, Member, Young Energy Scientists Advisory Board of FOM.
11. A. Polman, Member, Program Committee FOM-Shell/Helianthos Industrial Partnership Program Third generation solar cells.
12. A. Polman, Member, Board of Reviewing Editors, Science (AAAS).
13. A. Polman, Member, Editorial Advisory Board ACS Photonics (American Chemical Society).
14. A. Polman, Member, Editorial Advisory Board Applied Physics Reviews (American Physical Society).
15. A. Polman, Member, Editorial Advisory Board Advanced Optical Materials (Wiley).
16. A. Polman, Member, Editorial Advisory Board Nano Letters (American Chemical Society).

### **3. Knowledge transfer (societal and economic)**

#### **a. Patents**

#### **b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. Collaboration with Philips Research on nanophotonics, Industrial Partnership Program Nanophotonics for Solid State Lighting.
2. Collaboration with Philips Research on soft imprint lithography.
3. Technology transfer to Delmic B.V, Delft, on the angle-resolved cathodoluminescence imaging spectroscopy technique (ARCIS).
4. Collaboration with ECN on light management in solar cells.
5. Partner in Silicon Competence Center, TKI Solar Energy-funded facility with Tempres, Levitech, Eurotron, Roth &Rau, ASMI and ECN.
6. Project within Global Climate and Energy Program (GCEP, Stanford University), funded by ExxonMobil, GE, Schlumberger, and Toyota.

#### **c. Performances on television, radio or at public events**

1. A. Polman, *Solar energy*, Hoe?Zo! Radio, October 3, 2014.

#### **d. Publications in public magazines, newspapers or on the internet**

1. A. Polman, *Rubriek Mensen*, Het Parool, February 3, 2014.
2. A. Polman, *Perovskiet zonnecellen: heilige graal of hype? Wim Sinke en Albert Polman*, Solar Magazine, May, 2014.
3. A. Polman, *Slimmer gebruik van zonlicht levert veel meer stroom*, NRC Handelsblad, May 3, 2014.
4. W. Sinke, *De grote uitdaging komt na 2020*, Het Parool, May 27, 2014.
5. A. Polman, *Een zonnecel die alle kleuren vangt*, Het Parool, June 21, 2014.
6. A. Polman, *Plasmo-elektrisch effect*, NPO Radio, October 30, 2014.

7. A. Polman, *Laserlicht op goud leidt tot elektrische spanning*, De Volkskrant, November 3, 2014.
8. A. Polman, *Het collectief klotsen van elektronen*, NRC Handelsblad, November 8, 2014.
9. A. Polman, *Miniatuurrooster zet licht om in elektriciteit*, New Scientist, December, 2014.
10. A. Polman, Diverse berichten op internet.

**e. Other professional products (software, prototypes, etc.)**

1. Ultra-thin silicon solar cells based on light trapping nanopatterns.
2. Ultra-thin CIGS solar cells based on light trapping nanopatterns.
3. Metal nanowire transparent conductors.
4. Nanopatterend antireflection coatings.
5. Infrared cathodoluminescence imaging system.

**Outreach**

1. A. Polman, *Voor niets gaat de zon op*, Theatre-lecture, Purmaryn theatre, Purmerend, the Netherlands.
2. A. Polman, *Voor niets gaat de zon op*, Amsterdam Science Park Open Day, Amsterdam, the Netherlands.
3. A. Polman, lectures in master course Advanced Materials and Energy Physics (AMEP), University of Amsterdam.

**Group J. Gómez Rivas 2014****Fundings**

FOM-Philips IPP Improved Solid State Light Sources (SSL)  
 FOM-Philips IPP Nanophotonics for Solid State Lighting (NSL)  
 FOM-Program Nanophotovoltaics (NPV)  
 FOM-Program Plasmonics (PLSM)  
 ERC Starting Grant (ERC)  
 NanoNextNL Program 6B Functional Nanophotonics (NN6B)  
 NanoNextNL Program 6D Active Photonic Devices (NN6D)  
 STW-Project (LEDMAP)

**Employees**

Mark Aarts (stagiair)	-
Arkabrata Bhattacharya (OIO)	ERC
Imre Dehner (stagiair)	-
George Georgiou (OIO)	ERC
Grzegorz Grzela (OIO)	NPV
Alexei Halpin (PD)	NSL
Christiaan Mennes (stagiair)	-
Andrey Nikitin (PD)	STW
Giuseppe Pirruccio (OIO)	SSL
Said Rahimzadeh-Kalaleh Rodriguez (OIO)	SSL
Gopika Ramanandan (PD)	NSL
Mohammad Ramezani (OIO)	NSL
Martijn Schaafsma (OIO)	PLSM
Tom Steinbusch (stagiair)	-
Hemant Tyagi (PD)	SSL

**1. Academic publications****a. Peer reviewed Publications**

1. S.R.K. Rodriguez, F. Bernal Arango, T.P. Steinbusch, M.A. Verschuuren, A.F. Koenderink, J. Gómez Rivas, *Breaking the Symmetry of Forward-Backward Light Emission with Localized and Collective Magnetoelectric Resonances in Arrays of Pyramid-Shaped Aluminum Nanoparticles*, Phys. Rev. Lett. **113**, 247401: 1-5 (2014).
2. S.R.K. Rodriguez, Y. Chen, T.P. Steinbusch, M.A. Verschuuren, A.F. Koenderink, J. Gómez Rivas, *From weak to strong coupling of localized surface plasmons to guided modes in a luminescent slab*, Phys. Rev. B **90**, 235406:1-9 (2014).
3. T.P. Steinbusch, H.K. Tyagi, M.C. Schaafsma, G. Georgiou, J. Gómez Rivas, *Active terahertz beam steering by photo-generated graded index gratings in thin semiconductor films*, Opt. Express **22**, 26559-26571 (2014).

4. A. Abass, S.R.K. Rodriguez, T. Ako, T. Aubert, M.A. Verschuuren, D. van Thourhout, J. Beeckman, Z. Hens, J. Gómez Rivas, B. Maes, *Active Liquid Crystal Tuning of Plasmonic Enhanced Light Emission from Colloidal Quantum Dots*, *Nano Lett.* **14**, 5555–5560 (2014).
5. H.K. Tyagi, J. Gómez Rivas, *Photo-generated THz plasmonic waveguides*, *J. Opt.* **16**, 094011 1-7 (2014).
6. G. Lozano, G. Grzela, M.A. Verschuuren, J. Gómez Rivas, *Tailor-made directional emission in nanoimprinted plasmonic-based light-emitting devices*, *Nanoscale* **6**, 9223-9229 (2014).
7. G. Grzela, R. Paniagua-Domínguez, T. Barten, D. van Dam, J.A. Sánchez-Gil, J. Gómez Rivas, *Nanowire Antenna Absorption Probed with Time-Reversed Fourier Microscopy*, *Nano Lett.* **14**, 3227–3234 (2014).
8. G. Lozano, T. Barten, G. Grzela, J. Gómez Rivas, *Directional absorption by phased arrays of plasmonic nanoantennae probed with time-reversed Fourier microscopy*, *New J. Phys.* **16**, 013040 1-13 (2014).
9. G. Georgiou, H.K. Tyagi, P. Mulder, G. Bauhuis, J. Schermer, J. Gómez Rivas, *Photo-generated THz antennas*, *Sci. Rep.* **4**, 3584 1-5 (2014).

#### **b. Publications in proceedings or other journals**

1. S.R.K. Rodriguez, G. Lozano, M.A. Verschuuren, J. Gómez Rivas, *Lichtemissie van roosters van nanoantennes*, *NTvN* **80**, 20-23 (2014).
2. J. Gómez Rivas, S.R.K. Rodriguez, G. Lozano, *Nanophotonics for Solid State Lighting*, *Photonics Magazine* **39**, 19-23 (2014)
3. S. Murai, G.I. Lozano, S.R.K. Rodriguez, J. Gómez Rivas, M.A. Verschuuren, *Improving the efficiency of white LEDs*, *SPIE Newsroom*. DOI: 10.1117/2.1201409.005633 (2014).
4. M. Lunz, D. de Boer, G. Lozano, S.R.K. Rodriguez, J. Gómez Rivas, M.A. Verschuuren, *Plasmonic LED device*, **In: Photonic Crystal Materials and Devices XI** : Brussels, Belgium, April 14, 2014 / ed. S.G. Romanov, G. Lozano, D. Gerace, C. Monat and H.R. Míguez. - Bellingham: SPIE, 2014. - pp. proceeding 15: 6 pages. - (Proceedings of SPIE; 9127).

#### **c. Contributions to scientific books (chapters or entire book)**

1. S.L. Diedenhofen, G. Vecchi, G. Bauhuis, J. Gómez Rivas, *Broadband and omnidirectional anti-reflection coating for III/V multi-junction solar cells*, **In: High-Efficiency Solar Cells : Physics, Materials, and Devices** / ed. X. Wang and Z.M. Wang. - Cham: Springer, 2014. - pp. 571-595. - (Springer Series in Materials Science; 190).

#### **d. Proefschriften**

1. G. Pirruccio, *Coherent absorption in weakly absorbing layers*, Eindhoven University of Technology, November 13, 2014.
2. S.R.K. Rodriguez, *Coupling light and matter in metallic nanoparticle arrays*, University of Technology Eindhoven, September 2, 2014.

#### **e. Open Access publications**

### **2. Invited lectures, posters, awards and other activities**

#### **a. Invited lectures at international conferences and meetings**

1. J. Gómez Rivas, D. van Dam, G. Grzela, R. Paniagua, J.A. Sanchez Gil, *Semiconductor nanowires: emitting and receiving nanoantennas*, SPIE Photonics West, San Francisco, USA, February 1-6, 2014.
2. J. Gómez Rivas, G. Georgiou, H.K. Tyagi, T.P. Steinbuch, *Photo-generated resonant structures in flat semiconductor layers*, Nanolight 2014, Benasque, Spain, March 2-8, 2014.
3. J. Gómez Rivas, S. Murai, S.R.K. Rodriguez, *Hybrid Plasmonic-Photonic Modes in Diffractive Arrays of Nanoparticles Coupled to Light-Emitting Waveguides*, MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
4. J. Gómez Rivas, G. Lozano, S.R.K. Rodriguez, M.A. Verschuuren, *Plasmonics for Solid State Lighting*, E-MRS Spring Meeting, Lille, France, May 26-30, 2014.
5. J. Gómez Rivas, S.R.K. Rodriguez, G. Lozano, M.A. Verschuuren, *Collective plasmonic/photonic resonances coupled to luminescent molecules: from quantum critical phenomena to applications*, EOS Annual Meeting, Berlin, Germany, September 15-19, 2014.
6. J. Gómez Rivas, S.R.K. Rodriguez, M. Lutz, D. de Boer, R. van Brakel, M.A. Verschuuren, *Collective plasmonic/photonic resonances coupled to luminescent molecules: from quantum critical phenomena to applications*, NanoCity, Utrecht, the Netherlands, October 27-28, 2014.

#### **b. Other lectures and posters at (international) conferences and other scientific meetings**

1. G. Georgiou, M.C. Schaafsma, H.K. Tyagi, J. Gómez Rivas, *All-optical control of THz plasmonic surfaces* (talk), MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
2. G. Pirruccio, M.A. Verschuuren, J. Gómez Rivas, *Coherent Perfect Absorption in a luminescent slab: extension of the definition of the Stokes' shift* (talk), MRS Spring Meeting,

San Francisco, USA, April 21-25, 2014.

3. G. Georgiou, A. Bhattacharya, S. Sawallich, C. Matheisen, M. Nagel, J. Gómez Rivas, *Far-field and Near-field characterization of plasmonic resonators at THz frequencies* (poster), MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
4. G. Georgiou, M.C. Schaafsma, H.K. Tyagi, J. Gómez Rivas, *Active control of plasmonic resonances* (talk), META´14, Singapore, Singapore, May 20-23, 2014.
5. J. Gómez Rivas, S.R.K. Rodriguez, G. Lozano, M.A. Verschuuren, *Nanophotonics for Solid State Lighting* (talk), HTSM R&D for societal changes, Den Bosch, the Netherlands, September 23, 2014.
6. M.C. Schaafsma, G. Georgiou, J. Gómez Rivas, *Control of THz resonances in semiconductor plasmonic crystals* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
7. A. Bhattacharya, G. Georgiou, S. Sawallich, C. Matheisen, M. Nagel, J. Gómez Rivas, *Near-field measurements of plasmonic resonators at THz frequencies* (poster), NanoCity, Utrecht, the Netherlands, October 27-28, 2014.

**c. Awards and recognitions**

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

**3. Knowledge transfer (societal and economic)**

**a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

**Group A.F. Koenderink 2014****Fundings**

FOM-Projectruimte (PR)  
 FOM-Program Nanoscale Quantum Optics (NQO)  
 NanoNextNL Program 6B Functional Nanophotonics (NN6B)  
 NanoNextNL Program 6D Active Photonic Devices (NN6D)  
 NWO-VIDI (VIDI)  
 STW-Project (LEDMAP)  
 UvA samenwerkingsgelden (UVA)

**Employees**

Alessandro Antoncetti (stagiair)	-
Felipe Bernal Arango (OIO)	VIDI
Michele Cotrufo (gast)	-
Hugo Doeleman (OIO)	UVA
Mengqu Du (stagiair)	-
Cocoa Guo (OIO)	LEDMAP
Andrej Kwadrin (OIO)	PR
Lutz Langguth (OIO)	NN6D
Abbas Mohtashami (OIO)	VIDI
Clara Osorio (PD)	NN6B
Floor van Riggelen (stagiair)	-
Hinke Schokker (OIO)	NQO

**1. Academic publications****a. Peer reviewed Publications**

1. S.R.K. Rodriguez, F. Bernal Arango, T.P. Steinbusch, M.A. Verschuuren, A.F. Koenderink, J. Gómez Rivas, *Breaking the Symmetry of Forward-Backward Light Emission with Localized and Collective Magnetoelectric Resonances in Arrays of Pyramid-Shaped Aluminum Nanoparticles*, Phys. Rev. Lett. **113**, 247401: 1-5 (2014).
2. P. Lunnemann, A.F. Koenderink, *Dispersion of guided modes in two -dimensional split ring lattices*, Phys. Rev. B **90**, 245416 1-8 (2014).
3. S.R.K. Rodriguez, Y. Chen, T.P. Steinbusch, M.A. Verschuuren, A.F. Koenderink, J. Gómez Rivas, *From weak to strong coupling of localized surface plasmons to guided modes in a luminescent slab*, Phys. Rev. B **90**, 235406:1-9 (2014).
4. A.H. Schokker, A.F. Koenderink, *Lasing at the band edges of plasmonic lattices*, Phys. Rev. B **90**, 155452 1-10 (2014).
5. A. Mohtashami, T. Coenen, A. Antoncetti, A. Polman, A.F. Koenderink, *Nanoscale excitation mapping of plasmonic patch antennas*, ACS Photon. **1**, 1134-1143 (2014).

6. L. Langguth, A.F. Koenderink, *Simple model for plasmon enhanced fluorescence correlation spectroscopy*, *Opt. Express* **22**, 15397-15409 (2014).
7. F. Bernal Arango, T. Coenen, A.F. Koenderink, *Underpinning hybridization intuition for complex antennas by magnetolectric quadrupolar polarizability retrieval*, *ACS Photon.* **1**, 444-453 (2014).
8. T. Coenen, F. Bernal Arango, A.F. Koenderink, A. Polman, *Directional emission from a single plasmonic scatterer*, *Nature Commun.* **5**, 3250 1-5 (2014).
9. A. Kwadrin, A.F. Koenderink, *Diffraction stacks of metamaterial lattices with a complex unit cell : Self-consistent long-range bianisotropic interactions in experiment and theory*, *Phys. Rev. B* **89**, 045120 1-10 (2014).

#### **b. Publications in proceedings or other journals**

#### **c. Contributions to scientific books (chapters or entire book)**

1. P. Zijlstra, M. Orrit, A.F. Koenderink, *Metal Nanoparticles for Microscopy and Spectroscopy*, **In:** *Nanoparticles : Workhorses of Nanoscience / ed. C. de Mello Donegá. - Heidelberg: Springer, 2014. - pp. Chap. 3: 53-98.*

#### **d. PhD theses**

1. A. Kwadrin, *Magnetic Optical Scatterers and Backaction*, University of Amsterdam, September 10, 2014.
2. F. Bernal Arango, *Optical antennas on substrates and waveguides*, University of Amsterdam, September 19, 2014.

#### **e. Open Access publications**

1. A.H. Schokker, A.F. Koenderink, *Lasing at the band edges of plasmonic lattices*, *Phys. Rev. B* **90**, 155452 1-10 (2014). [ arXiv: 1409.7293 ]
2. S.R.K. Rodriguez, Y. Chen, T.P. Steinbusch, M.A. Verschuuren, A.F. Koenderink, J. Gómez Rivas, *From weak to strong coupling of localized surface plasmons to guided modes in a luminescent slab*, *Phys. Rev. B* **90**, 235406:1-9 (2014). [ arXiv: 1406.6568 ]
3. P. Lunnemann, A.F. Koenderink, *Dispersion of guided modes in two -dimensional split ring lattices*, *Phys. Rev. B* **90**, 245416 1-8 (2014). [ arXiv: 1410.4166 ]
4. L. Langguth, A.F. Koenderink, *Simple model for plasmon enhanced fluorescence correlation spectroscopy*, *Opt. Express* **22**, 15397-15409 (2014).

## 2. Invited lectures, posters, awards and other activities

### a. Invited lectures at international conferences and meetings

1. A.F. Koenderink, *Multipoles and coupled oscillators in nano-optics: The need to quantify intuition*, Nanolight 2014, Benasque, Spain, March 2-8, 2014.
2. A.F. Koenderink, *Magnetic and electric modes in optical nanoantennas*, EBSN, Amsterdam, the Netherlands, June 2-4, 2014.
3. A.F. Koenderink, *Enhancing electric and magnetic LDOS with plasmonic and metamaterial antennas, and vice versa*, Nanoscale Quantum Optics Workshop, Lorentz Center, Leiden, the Netherlands, June 2-6, 2014.
4. A.F. Koenderink, *Metamaterial scattering arrays: band structures, back action and gain*, Metamaterials 2014, Copenhagen, Denmark, August 25-28, 2014.

### b. Other lectures and posters at (international) conferences and other scientific meetings

1. A.F. Koenderink, *Controlling single photon emitters by hybridizing plasmonic antennas with dielectric resonators* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. M.C. van Lare, F. Lenzmann, M.A. Verschuuren, A.F. Koenderink, A. Polman, *Spatial correlations in dielectric light-trapping metasurfaces on a-Si:H and CuInGaSe solar cells* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2013.
3. L. Langguth, D. Punj, J. Wenger, A.F. Koenderink, *Plasmonic band structure controls single molecule fluorescence* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
4. F.T. Rabouw, P. Lunnemann, R. van Dijk-Moes, M. Frimmer, F. Pietra, D. Vanmaekelbergh, A.F. Koenderink, *Reduced Auger recombination in single CdSe/CdS nanorods by one-dimensional electron delocalization* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
5. F. Bernal Arango, A. Mohtashami, T. Coenen, A.F. Koenderink, *Light emission near multipolar plasmon antennas in close proximity to general multilayer systems* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2013.
6. C.I. Osorio, P. Lunnemann, A. Mohtashami, A.F. Koenderink, *Characterization of emitters and their photonic environment by using a simple ball lens* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
7. A.H. Schokker, Y. Chen, S.R.K. Rodriguez, J. Gómez Rivas, A.F. Koenderink, *Lasing at the band edges of photonic lattices* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.

8. C.I. Osorio, *Polarimetry in Fourier Microscopy* (talk), Quantum Optics Seminar, Leiden Institute of Physics, Leiden, the Netherlands, May 16, 2014.
9. F.T. Rabouw, P. Lunnemann, R. van Dijk-Moes, M. Frimmer, F. Pietra, D. Vanmaekelbergh, A.F. Koenderink, *Reduced Auger recombination in single CdSe/CdS nanorods* (poster), Workshop '30 years of colloidal quantum dots', Paris, France, May 26-28 (2014).
10. F. Bernal Arango, R. Thijssen, B.J.M. Brenny, T. Coenen, A. Polman, A.F. Koenderink, *Localized excitation of antennas on waveguides* (poster), EBSN, Amsterdam, the Netherlands, June 2-4, 2014.
11. T. Coenen, F. Bernal Arango, A.F. Koenderink, A. Polman, *Directional emission from a single plasmonic scatterer* (poster), EBSN, Amsterdam, the Netherlands, June 2-4, 2014.
12. A. Mohtashami, T. Coenen, A. Antoncicchi, A. Polman, A.F. Koenderink, *Investigation of resonant modes in plasmonic patch antennas using cathodoluminescence spectroscopy* (poster), EBSN, Amsterdam, the Netherlands, June 2-4, 2014.
13. A.H. Schokker, Y. Chen, S.R.K. Rodriguez, J. Gómez Rivas, A.F. Koenderink, *Lasing at the band edges of photonic lattices* (poster), Nanoscale Quantum Optics Workshop, Lorentz Center, Leiden, the Netherlands, June 2-6, 2014.
14. C.I. Osorio, *K-space polarimetry of Bull's eye antennas* (talk), Seminar Danish Technical University, Copenhagen, Denmark, August 7, 2014.
15. Y. Chen, A.F. Koenderink, *Improving light emission by plasmonic lattices coupled to waveguides* (talk), PIERS 2014, Guangzhou, China, August 25-28, 2014.
16. A.F. Koenderink, *Controlling photons with nano-antennas* (talk), Seminar Niels Bohr Institute, Copenhagen, Denmark, August 28, 2014.
17. C.I. Osorio, A. Mohtashami, A.F. Koenderink, *K-space polarimetry of Bull's eye antennas* (talk), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
18. F. Ruesink, R. Hendrikx, H. Doeleman, A.F. Koenderink, E. Verhagen, *Dispersive and dissipative coupling of high Q microcavity modes to gold nano-antenna arrays* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
19. C.I. Osorio, A. Mohtashami, A.F. Koenderink, *Polarimetry in Fourier microscopy*, NanoCity, Utrecht, the Netherlands, October 27-28, 2014.
20. L. Langguth, A.F. Koenderink, *Nanoantenna enhanced fluorescence correlation spectroscopies* (poster), MRS Fall Meeting, Boston, USA, December 1-5, 2014.

### c. Awards and recognitions

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. A.F. Koenderink, Member of the DJA (Young Academy) of the KNAW.
2. A.F. Koenderink, Board member section NNV AMO – co-organizer of the 38<sup>th</sup> NNV AMO Lunteren meeting.
3. A.F. Koenderink, Board member Stichting Atelier van Licht.
4. A.F. Koenderink, Expert, “Raad voor de Leefomgeving – Zicht op technologieën”, Utrecht, the Netherlands, June 26, 2014.
5. A.F. Koenderink, Technical Program Committee Metamaterials’14, The 8<sup>th</sup> International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, to be held in Copenhagen, August 2014.
6. A.F. Koenderink, Member, Program committee topic ‘Plasmonics and Metamaterials’, CLEO/Europe-EQEC 2015, Munich, Germany, June, 2015.
7. A.F. Koenderink, Member, Editorial Board, Physical Review A.
8. A.F. Koenderink, Member, Jury FOM Projectruimte, Fall 2014.

**3. Knowledge transfer (societal and economic)**

**a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. Partnerships in NanoNextNL programs 6B and 6D (Philips Research, ASML, LioniX, Xio Photonics, PhoeniX).
2. In het kader van nieuw gestart STW – Philips partnership ‘Advanced and Sustainable Lighting Solutions’ regulier overleg met Dr. M. Verschuuren en Dr. D. de Boer, Philips Research.

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

1. C. I. Osorio, “La Luz con Nobel” publiekslezing bij evenement “Festival de las Luces Medellin”, Parque Explora Medellin, Medellin, Colombia, December 4, 2014.  
<http://new.livestream.com/ParqueExploraTV/Fisica>.

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

1. A.F. Koenderink, initiatiefnemer samen met de overige in 2012 geïnstalleerde leden van De Jonge Akademie van 'Kennis Op Straat', een internet portal via welke verenigingen, scholen en andere maatschappelijke instellingen een enthousiaste wetenschapper kunnen bestellen voor een toegankelijke en gratis lezing. Zie: [www.kennisopstraat.nl](http://www.kennisopstraat.nl).
2. A.F. Koenderink, lezing Doolhof voor licht, voor VWO-4 leerlingen Kennemer College, Beverwijk, November 10, 2013.

## Group E. Verhagen 2014

### Fundings

Start-up AMOLF (Start-up)

FOM-Philips IPP Nanophotonics for Solid State Lighting (NSL)

NWO-VIDI (VIDI)

### Employees

Aloys Erkelens (stagiair)	-
Lars Freisem (stagiair)	-
Ruud Hendrikx (stagiair)	-
Rick Leijssen (OIO)	Start-up
Randy Meijer (stagiair)	-
Freek Ruesink (OIO)	Start-up

## 1. Academic publications

### a. Peer reviewed Publications

1. R. Maas, E. Verhagen, J. Parsons, A. Polman, *Negative refractive index and higher-order harmonics in layered metallodielectric optical metamaterials*, ACS Photon. **1**, 670-676 (2014).
2. R. Thijssen, T.J. Kippenberg, A. Polman, E. Verhagen, *Parallel transduction of nanomechanical motion using plasmonic resonators*, ACS Photon. **1**, 1181-1188 (2014).

### b. Publications in proceedings or other journals

### c. Contributions to scientific books (chapters or entire book)

### d. PhD theses

1. R. Thijssen, *Plasmonic nanomechanical transduction*, University of Amsterdam, September 4, 2014.

### e. Open Access publications

## 2. Invited lectures, posters, awards and other activities

### a. Invited lectures at international conferences and meetings

1. E. Verhagen, *Nanomechanical transduction using extremely confined light fields*, Frontiers of Opto- and Electro-mechanics workshop, Fai della Paganella, Italy, January 29, 2014.

2. E. Verhagen, *Nanomechanical transduction and optical forces in plasmonic systems*, MRS Spring Meeting, San Francisco, USA, April 21-25, 2014.
3. E. Verhagen, *Nanomechanical transduction in plasmonic systems*, SPIE Optics + Photonics, San Diego, USA, August 17-21, 2014.
4. E. Verhagen, *Nanomechanical transduction using extremely confined light fields*, NanoCity, Utrecht, the Netherlands, October 27-28, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. R. Leijssen, E. Verhagen, *Efficient transduction of nanomechanical motion with photonic crystal cavities* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. R. Leijssen, E. Verhagen, *Efficient transduction of nanomechanical motion with photonic crystal cavities via wavefront shaping* (poster), Gordon Research Conference on Mechanical Systems in the Quantum Regime, Ventura, USA, March 9-14, 2014.
3. R. Thijssen, T.J. Kippenberg, A. Polman, E. Verhagen, *Plasmonic nanomechanical transducers* (poster), Gordon Research Conference on Mechanical Systems in the Quantum Regime, Ventura, USA, March 9-14, 2014.
4. E. Verhagen, *Coupling light and motion using extremely confined light fields* (talk), Van der Waals Colloquium, Leiden Institute of Physics, Leiden, the Netherlands, May 23, 2014.
5. R. Thijssen, T.J. Kippenberg, A. Polman, E. Verhagen, *Plasmonic nanomechanical transducers* (poster), Gordon Research Conference on Plasmonics, Newry, USA, July 7-10, 2014.
6. R. Leijssen, E. Verhagen, *Shaking light with nanobridges – photonic crystal nanobeams with large optomechanical coupling* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
7. F. Ruesink, R. Hendrikx, H. Doeleman, A.F. Koenderink, E. Verhagen, *Dispersive and dissipative coupling of high Q microcavity modes to gold nano-antenna arrays* (poster), NNV-AMO 2014, Lunteren, the Netherlands, October 7-8, 2014.
8. E. Verhagen, *Optomechanics with nanophotonic systems* (talk), NB-Photonics Seminar, University of Ghent, Ghent, Belgium, December 5, 2014.

**c. Awards and recognitions**

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

**3. Knowledge transfer (societal and economic)**

**a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. TNO (H. Sadeghian, G. Gerini), led to joint submission of STW HTSM proposal on *Nano-optomechanical meta-instruments for sensing and inspection*.

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**



**e. Other professional products (software, prototypes, etc.)**

**Outreach**

**Group H.J. Bakker 2014****Fundings**

FOM-Program Proton mobility in confinement (PMC)

FOM-Projectruimte Hydrophobes (PRH)

FOM-Projectruimte Melting of ice (PRI)

FOM-IPP Program Spectroscopy analysis of particles in water (SAPW)

Water interacting with proteins (CWE)

Anti-freeze proteins (CWA)

NanoNextNL Program 5B Molecular Structure of Food (NN5B)

NWO-VENI (VENI)

**Employees**

Artem Bakulin (PD)	VENI
Carien Groot (OIO)	NN5B
Liyuan Liu (OIO)	PMC
Stephan Lotze (OIO)	CWA
Konrad Meister (PD)	CWA
Niklas Ottosson (PD)	PMC
Sietse van der Post (OIO)	PRH
Wilbert Smit (OIO)	PRI
Simona Strazdaite (OIO)	SAPW

**1. Academic publications****a. Peer reviewed Publications**

1. K. Meister, S. Strazdaite, A.L. DeVries, S. Lotze, L.L.C. Olijve, I.K. Voets, H.J. Bakker, *Observation of ice-like water layers at an aqueous protein surface*, PNAS **111**, 17732–17736 (2014).
2. T.H. van der Loop, N. Ottosson, S. Lotze, E. Kentzinger, T. Vad, W.F.C. Sager, H.J. Bakker, S. Woutersen, *Structure and dynamics of water in nanoscopic spheres and tubes*, J. Chem. Phys. **141**, 18C535 1-10 (2014).
3. N. Ottosson, J. Hunger, H.J. Bakker, *Effect of cations on the hydrated proton*, J. Am. Chem. Soc. **136**, 12808–12811 (2014).
4. C.-S. Hsieh, H.J. Bakker, L. Piatkowski, M. Bonn, *Gigahertz modulation of femtosecond time-resolved surface sum-frequency generation due to acoustic strain pulses*, J. Phys. Chem. C **118**, 20875-20880 (2014).
5. S. Lotze, L.L.C. Olijve, I.K. Voets, H.J. Bakker, *Observation of Vibrational Energy Exchange in a Type-III Antifreeze Protein*, J. Phys. Chem. B **118**, 8962–8971 (2014).

6. S.T. van der Post, H.J. Bakker, *Femtosecond Mid-infrared Study of the Reorientation of Weakly Hydrogen-bonded Water Molecules*, J. Phys. Chem. B **118**, 8179–8189 (2014).
7. L. Liu, H.J. Bakker, *Infrared-activated proton transfer in aqueous Nafion proton-exchange-membrane nanochannels*, Phys. Rev. Lett. **112**, 258301 1-5 (2014).
8. C.C.M. Groot, H.J. Bakker, *Hydration dynamics of aqueous glucose probed with polarization-resolved fs-IR spectroscopy*, J. Chem. Phys. **140**, 234503 1-7 (2014).
9. L. Piatkowski, Z. Zhang, E.H.G. Backus, H.J. Bakker, M. Bonn, *Extreme surface propensity of halide ions in water*, Nature Commun. **5**, 4083 1-3 (2014).
10. N. Ottosson, M. Pastorczyk, S.T. van der Post, H.J. Bakker, *Conformation of the neurotransmitter  $\gamma$ -aminobutyric acid in liquid water*, Phys. Chem. Chem. Phys. **16**, 10433-10437 (2014).
11. E.H.G. Backus, K.J. Tielrooij, M. Bonn, H.J. Bakker, *Probing ultrafast temperature changes of aqueous solutions with coherent terahertz pulses*, Opt. Lett. **39**, 1717-1720 (2014).
12. S.T. van der Post, J. Hunger, M. Bonn, H.J. Bakker, *Observation of water separated ion-pairs between cations and phospholipid headgroups*, J. Phys. Chem. B **118**, 4397-4403 (2014).
13. S.K. Eriksson, I. Josefsson, N. Ottosson, G. Öhrwall, O. Björneholme, H. Siegbahn, A. Hagfeldt, M. Odellius, H. Rensmo, *Solvent Dependence of the Electronic Structure of I<sup>-</sup> and I<sub>3</sub><sup>-</sup>*, J. Phys. Chem. B **118**, 3164–3174 (2014).
14. S. Strazdaite, J. Versluis, E.H.G. Backus, H.J. Bakker, *Enhanced ordering of water at hydrophobic surfaces*, J. Chem. Phys. **140**, 054711 1-5 (2014).

#### **b. Publications in proceedings or other journals**

#### **c. Contributions to scientific books (chapters or entire book)**

#### **d. PhD theses**

1. S.T. van der Post, *Love and fear of water : water dynamics around charged and apolar solutes*, University of Amsterdam, February 7, 2014.

#### **e. Open Access publications**

## 2. Invited lectures, posters, awards and other activities

### a. Invited lectures at international conferences and meetings

1. H.J. Bakker, *Interfacial Water detected with Surface Sum-Frequency Generation*, Lorentz Workshop Adsorption of Ions at Solid-Electrolyte Interfaces, Leiden, the Netherlands, March 10-14, 2014.
2. H.J. Bakker, *Why ducks don't need a towel: structure and dynamics of water near hydrophobes*, Hydrophobicity: from Theory, Simulation, to Experiment, Telluride, USA, June 24-28, 2014.
3. N. Ottosson, *Perturbed Aqueous Protons*, Workshop Interfacial Molecular and Electronic Structure and Dynamics, Telluride, USA, July 7-11, 2014.
4. H.J. Bakker, *2D-IR Vibrational Spectroscopy of Proton Fluxional Defects in Aqueous Nanochannel*, Gordon Research Conference on Vibrational Spectroscopy, Biddeford, USA, August 3-8, 2014.
5. N. Ottosson, *Tracking Ultrafast Molecular Motions in the Aqueous Phase - an Experimentalist's Approach*, Uppsala University, Uppsala, Sweden, October, 2014.
6. H.J. Bakker, *Structure of water at hydrophobic surfaces*, Heraeus Workshop, Bad Honnef, Germany, October 27-30, 2014.
7. N. Ottosson, *Probing Aqueous Biomolecular Systems with Photoelectron Spectroscopy*, SpecBio, Rio de Janeiro, Brazil, October 29-31, 2014.

### b. Other lectures and posters at (international) conferences and other scientific meetings

1. S. Strazdaite, J. Versluis, H.J. Bakker, *Water ordering at hydrophobic surfaces detected with surface sum-frequency generation* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. C.C.M. Groot, H.J. Bakker, *Hydration dynamics of aqueous glucose probed with polarization resolved fs-IR spectroscopy* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
3. W.J. Smit, H.J. Bakker, *Anomalous temperature dependence of the OD stretch vibrational lifetime in ice and liquid water* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.

4. S. Lotze, H.J. Bakker, *Conformational Dynamics of a Type III Antifreeze Protein Studied with Time-resolved Vibrational Spectroscopy* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
5. L. Liu, S. Strazdaite, H.J. Bakker, *Surface Propensity of  $CF_3SO_3^-$  Anions for Triflic Acid and Triflate Sodium Solutions* (poster), Gordon Conference on Vibrational Spectroscopy, Biddeford, USA, August 3-8, 2014.
6. C.C.M. Groot, H.J. Bakker, *Hydration dynamics of aqueous glucose probed with polarization resolved fs-IR spectroscopy* (poster), Gordon Conference on Vibrational Spectroscopy, Biddeford, USA, August 3-8, 2014.
7. C.C.M. Groot, H.J. Bakker, *Hydration dynamics of aqueous glucose probed with polarization resolved fs-IR spectroscopy* (poster), NanoCity 2014, Utrecht, the Netherlands, October 27, 2014.

### **c. Awards and recognitions**

### **d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. H.J. Bakker, Member, Programme Advisory Committee, Free electron laser ELIX, Nijmegen.
2. H.J. Bakker, Member, Advisory Editorial Board of Chemical Physics Letters.
3. H.J. Bakker, Member, Advisory Editorial Board of Chemical Physics.
4. H.J. Bakker, Member, Editorial Advisory Board of ChemPhysChem.
5. H.J. Bakker, Editor, Special Issue on Multi-dimensional Spectroscopy, The Journal of Chemical Physics.
6. H.J. Bakker, Member, Programme Committee Time-Resolved Vibrational Spectroscopy.
7. H.J. Bakker, Member, Local Organizing Committee, Coherent Multi-dimensional Spectroscopy.
8. H.J. Bakker, Coordinator ARCNL-AMOLF Programme.

## **3. Knowledge transfer (societal and economic)**

### **a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. H.J. Bakker, Consultant ASML, Modeling CO<sub>2</sub> laser amplification

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

1. H.J. Bakker, Jury voorzitter Techniektoernooi Paulusschool, Castricum, the Netherlands, March 28, 2014.

## Group R.M.A. Heeren 2014

### Fundings

Shell  
 COMMIT  
 NPC  
 STW  
 COAST  
 EU-COST  
 J&J  
 INIBIC  
 NWO-Molhair  
 NIH-R01  
 SNF  
 FWO

### Employees

Anne Bruinen (OIO)	STW
Berta Cillero Pastor (PD)	INIBIC/COMMIT
Eva Cuypers (gast)	FWO
Marc Duursma	-
Gert Eijkel	-
Shane Ellis (PD)	STW
Bryn Flinders (PD)	NWO-Molhair
Frans Giskes	-
Bob Hommersom (OIO)	VIDI Mirjam Leunissen
Mark Jansen (OIO)	Shell
Guzel Kireeva (OIO)	Shell
Nadine Mascini (OIO)	COMMIT
Irene Ouburg (gast)	COAST-ASTP
Tiffany Porta (gast)	SNF
Chris Rétif (gast)	-
Karolina Skrášková (OIO)	-
Panagiotis Spyropoulos (stagiair)	UvA
Sarfaraz Syed (PD)	COAST (uMS)

## 1. Academic publications

### a. Peer reviewed Publications

1. M.-F. Robbe, J.-P. Both, B. Prideaux, I. Klinkert, V. Picaud, T. Schramm, A. Hester, V. Guevara, M. Stoeckli, A. Römpf, R.M.A. Heeren, B. Spengler, O. Gal, S. Haan, *Software tools of the Computis European project to process mass spectrometry images*, Eur. J. Mass Spectrom. **20**, 351–360 (2014).

2. C. Seaman, B. Flinders, G.B. Eijkel, R.M.A. Heeren, N. Bricklebank, M.R. Clench, "Afterlife Experiment" : Use of MALDI-MS and SIMS Imaging for the Study of the Nitrogen Cycle within Plants, *Anal. Chem.* **86**, 10071–10077 (2014).
3. W.M. Abdelmoula, K. Škrášková, B. Balluff, R.J. Carreira, B.F.P. Lelieveldt, L. van der Maaten, H. Morreau, A.M.J.M. van den Maagdenberg, R.M.A. Heeren, L.A. McDonnell, *Automatic generic registration of Mass Spectrometry Imaging Data to histology using nonlinear stochastic embedding*, *Anal. Chem.* **86**, 9204–9211 (2014).
4. E. Cuypers, B. Flinders, I.J. Bosman, K.J. Lusthof, A.C. Van Asten, R.M.A. Heeren, *Hydrogen peroxide reactions on cocaine in hair using imaging mass spectrometry*, *Forensic Sci. Int.* **242**, 103-110 (2014).
5. S.U.A.H. Syed, P.G. Kistemaker, G.B. Eijkel, S.R. Ellis, S. Maher, D.F. Smith, R.M.A. Heeren, *Experimental Investigation of the 2D Ion Beam Profile Generated by an ESI Octopole-QMS System*, *J. Am. Soc. Mass Spectrom.* **25**, 1780-1787 (2014).
6. N.O. Potocnik, K. Škrášková, B. Flinders, P. Pelicon, R.M.A. Heeren, *Gold sputtered fiducial markers for combined secondary ion mass spectrometry and MALDI imaging of tissue samples*, *Anal. Chem.* **86**, 6781-6785 (2014).
7. J.D. DeBord, D.F. Smith, C.R. Anderton, R.M.A. Heeren, L. Pasa-Tolic, R.H. Gomer, F. Fernandez-Lima, *Secondary Ion Mass Spectrometry Imaging of Dictyostelium discoideum Aggregation Streams*, *PLoS One* **9**, e99319 1-7 (2014).
8. S.R. Ellis, J. Soltwisch, R.M.A. Heeren, *Time-resolved imaging of the MALDI linear-TOF ion cloud : Direct visualisation and exploitation of ion optical phenomena using a position and time sensitive detector*, *J. Am. Soc. Mass Spectrom.* **25**, 809-819 (2014).
9. I. Klinkert, K. Chughtai, S.R. Ellis, R.M.A. Heeren, *Methods for full resolution data exploration and visualization for large 2D and 3D Mass Spectrometry Imaging datasets*, *Int. J. Mass Spectrom.* **362**, 40-47 (2014).
10. M.J. Pfeffers, B. Cillero Pastor, G.B. Eijkel, P.D. Clegg, R.M.A. Heeren, *Matrix assisted laser desorption ionization mass spectrometry imaging identifies markers of ageing and osteoarthritic cartilage*, *Arthritis Res. Ther.* **16**, R110 1-12 (2014).
11. A. Kiss, D.F. Smith, B.R. Reschke, M.J. Powell, R.M.A. Heeren, *Top-down mass spectrometry imaging of intact proteins by laser ablation ESIFT-ICR MS*, *Proteomics* **14**, 1283-1289 (2014).

12. E. Schioppa, S.R. Ellis, A.L. Bruinen, J. Visser, R.M.A. Heeren, J. Uher, E. Koffeeman, *Combined X-ray CT and mass spectrometry for biomedical imaging applications*, *J. Instrum.* **9**, C04029 1-10 (2014).
13. A. Mashaghi, S. Mashaghi, I. Reviakine, R.M.A. Heeren, V. Sandoghdar, M. Bonn, *Label-free characterization of bio-membranes : from structure to dynamics*, *Chem. Soc. Rev.* **43**, 887-900 (2014).
14. B. Cillero Pastor, R.M.A. Heeren, *Matrix assisted laser desorption ionization MASS SPECTROMETRY IMAGING for peptide and protein analyses : critical review on on-tissue digestion*, *J. Proteome Res.* **13**, 325-335 (2014).
15. S.R. Ellis, A.L. Bruinen, R.M.A. Heeren, *A critical evaluation of the current state-of-the-art in quantitative imaging mass spectrometry*, *Anal. Bioanal. Chem.* **406**, 1275-1289 (2014).
16. J. Soltwisch, G. Göritz, J.H. Jungmann, A. Kiss, D.F. Smith, S.R. Ellis, R.M.A. Heeren, *MALDI mass spectrometry imaging in microscope mode with infrared lasers : bypassing the diffraction limits*, *Anal. Chem.* **86**, 321-325 (2014).
17. D.F. Smith, C.A. Schulz, M. Konijnenburg, M. Kilic, R.M.A. Heeren, *Distributed computing strategies for processing of FT-ICR MS imaging datasets for continuous mode data visualization*, *Anal. Bioanal. Chem.* Online first (2014).
18. L.A. McDonnell, A. Römpf, B. Balluff, R.M.A. Heeren, J.P. Albar, P.E. Andrén, G.L. Corthals, A. Walch, M. Stoeckli, *Discussion point : reporting guidelines for mass spectrometry imaging*, *Anal. Bioanal. Chem.* Online first, (2014).
19. S.U.A.H. Syed, G.B. Eijkel, S. Maher, P.G. Kistemaker, S. Taylor, R.M.A. Heeren, *A Micro Pixelated Ion Imaging Detector for Mass Resolution Enhancement of a QMS Instrument*, *Anal. Bioanal. Chem.* Online first, (2014).

#### **b. Publications in proceedings or other journals**

#### **c. Contributions to scientific books (chapters or entire book)**

#### **d. PhD theses**

1. A. Kiss, *New ionization and detection technologies for Mass Spectrometry Imaging : From small molecules to intact proteins*, Utrecht University, January 8, 2014.

#### **e. Open Access publications**

## 2. Invited lectures, posters awards and other activities

### a. Invited lectures at international conferences and meetings

1. R.M.A. Heeren, *Imaging Mass Spectrometry*, Seminar Advanced Biomedical Translational Imaging, Maastricht, the Netherlands, January 9, 2014.
2. R.M.A. Heeren, *The study of molecular disease profiles with mass spectrometry based molecular imaging approaches*, Josef Stefan Institute, Ljubjana, Slovenia, January 23, 2014.
3. R.M.A. Heeren, *Imaging the molecular complexity of surfaces with a mass microscope*, Unilever Research Laboratory, Vlaardingen, the Netherlands, January 29, 2014.
4. R.M.A. Heeren, *Imaging mass spectrometry reveals complex molecular signals of disease*, 28th ISMAS Symposium cum Workshop on Mass Spectrometry, Parwanoo Himachal Pradesh, India, March 9-13, 2014.
5. R.M.A. Heeren, *Molecular Imaging of complex surfaces with Mass Spectrometry*, Shell Conference, Amsterdam, the Netherlands, March 26-28, 2014.
6. R.M.A. Heeren, *Imaging with Ions and Electrons*, UPPCON, Obergurgl, Austria, March 30-April 2, 2014.
7. R.M.A. Heeren, *A primer to Multimodal Imaging MS*, European Molecular Imaging Meeting, Antwerpen, Belgium, June 4-6, 2014.
8. R.M.A. Heeren, *Imaging Mass Spectrometry*, 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
9. R.M.A. Heeren, *Molecular Imaging of tissue: A new methodology to study lipids*, 55th International Conference on the Biosciences of Lipids, Aberdeen, Scotland, June 23-28, 2014.
10. R.M.A. Heeren, *New views on complex surfaces with Imaging Mass Spectrometry*, 8th Summer School Mass Spectrometry in Biotechnology and Medicine, Dubrovnik, Croatia, July 6-12, 2014.
11. R.M.A. Heeren, *Imaging Mass Spectrometry: A Primer*, 8th Summer School Mass Spectrometry in Biotechnology and Medicine, Dubrovnik, Croatia, July 6-12, 2014.
12. R.M.A. Heeren, *Molecular scales: Imaging signals of disease with mass spectrometry*, 18th International Microscopy Conference, Prague, Czech Republic, September 7-12, 2014.

13. R.M.A. Heeren, *The Maastricht MultiModal Molecular Imaging Institute*, Interregio-meeting Maastricht Health Campus, Maastricht, the Netherlands, September 18, 2014.
14. R.M.A. Heeren, A.L. Bruinen, T. Porta, S.R. Ellis, *High mass detection in Imaging Mass Spectrometry*, 22nd International Mass Spectrometry Conference, Geneva, Switzerland, September 24-28, 2014.
15. C. Anderton, D.F. Smith, F. Leach, R.M.A. Heeren, L. Pasa-Tolic, *Expanding the usefulness of secondary ion mass spectrometry for biologically relevant measurements*, 22nd International Mass Spectrometry Conference, Geneva, Switzerland, September 24-28, 2014.
16. R.M.A. Heeren, *Multimodal molecular imaging: adding dimensions*, 13th HUPO, Madrid, Spain, October 5, 2014.
17. R.M.A. Heeren, *Multimodal molecular imaging: Instruments for translational research*, OurCon II, Antalya, Turkey, November 18-21, 2014.
18. R.M.A. Heeren, *Revealing molecular complexity: Diagnostics for personalized medicine*, Friedrich Schiller University, Jena, Germany, November 24, 2014.
19. R.M.A. Heeren, *Imaging mobility of molecules: uncovering hidden features*, Waters Omics Summit, Wilmslow, UK, December 9-10, 2014.
20. R.M.A. Heeren, *Imaging connections: Seeing signals of health and disease*, NUTRIM Symposium, Maastricht, the Netherlands, December 17, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. R.M.A. Heeren, *Innovative Interdisciplinary Imaging: Visualizing molecular signals of disease* (talk), NPC Progress Meeting, Utrecht, the Netherlands, February 10-11, 2014.
2. N.E. Mascini, A. Rizwan, L. Jiang, M. Cheng, K. Glunde, R.M.A. Heeren, *Mass Spectrometry Imaging of Breast Tumor Hypoxia Using the Chemical Marker Pimonidazole* (poster), NPC Progress Meeting, Utrecht, the Netherlands, February 10-11, 2014.
3. B. Cillero Pastor, B. Rocha, R.M.A. Heeren, F.J. Blanco, B. Carames, *Lipid regulations induced by pharmaceutical treatment in osteoarthritic human articular cartilage is revealed by MALDI imaging* (poster), NPC Progress Meeting, Utrecht, the Netherlands, February 10-11, 2014.

4. S.R. Ellis, J. Soltwisch, R.M.A. Heeren, *Imaging Ions and Neutrals in MALDI-Linear-TOF-MS* (talk), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
5. K. Škrášková, G.B. Eijkel, M. Baes, P.P. van Veldhoven, S. de Munter, R.M.A. Heeren, *Combined mass spectrometry and multivariate data analysis image accumulation of fatty acids in the hindbrain of mouse models with impaired peroxisomal  $\beta$ -oxidation* (talk), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
6. B. Flinders, E. Cuypers, H. Zeijlemaker, R.M.A. Heeren, *Preparation of longitudinal sections of hair samples for analysis by multi-modal mass spectrometry imaging* (poster), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
7. E. Cuypers, B. Flinders, I. Bosman, K.J. Lusthof, A.C. van Asten, J. Tytgat, R.M.A. Heeren, *Hydrogen peroxide effect on cocaine in users hair using imaging mass spectrometry* (poster), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
8. N.E. Mascini, A. Rizwan, L. Jiang, M. Cheng, K. Glunde, R.M.A. Heeren, *Mass Spectrometry Imaging of Breast Tumor Hypoxia Using the Chemical Marker Pimonidazole* (poster), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
9. A.L. Bruinen, C. van Oevelen, G.B. Eijkel, M. van Heerden, F. Cuyckens, R.M.A. Heeren, *Mass spectrometry imaging of drug related crystal-like structures in formalin-fixed frozen and paraffin embedded rabbit kidney tissue sections* (poster), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
10. M. Jansen, M.C. Duursma, P. Arisz, D.F. Smith, P. Mul, H. Kuijpers, E. Tegelaar, F. Korndorffed, J. Pureveen, R.M.A. Heeren, *Mass spectrometry imaging of crude oil interfaces with water/brine and surfactants* (poster), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
11. B. Hommersom, S.R. Ellis, T. Porta, R.M.A. Heeren, *Fundamental spray characteristics and complex formation using SAWN and ESI* (poster), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
12. T. Porta, S.R. Ellis, D.J. Spaanderman, R. Buijs, M.C. Duursma, R.M.A. Heeren, *Evaluation of a new combination integrating an ion funnel and an active pixel detector for the efficient transmission and detection of native proteins generated by electrospray ionization* (poster), NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.

13. N. Georgi, B. Cillero Pastor, G.B. Eijkel, P. C. Periyasamy, A. Kiss, C. van Blitterswijk, J.N. Post, R.M.A. Heeren, M. Karperien, *Lipids as mediators of chondrogenesis* (talk), OARSI World Congress, Paris, France, April 24-27, 2014.
14. B. Cillero Pastor, G.B. Eijkel, F. Blanco, R.M.A. Heeren, *Specific peptide distribution in human osteoarthritic synovial membranes reveals different grades of tissue inflammation* (talk), OARSI World Congress, Paris, France, April 24-27, 2014.
15. B. Rocha, B. Cillero Pastor, G.B. Eijkel, C. Ruiz-Romero, R.M.A. Heeren, F.J. Blanco, *Differential lipid profiles of human mesenchymal stem cells undergoing chondrogenesis by MALDI mass spectrometric imaging* (talk), OARSI World Congress, Paris, France, April 24-27, 2014.
16. E. Cuypers, B. Flinders, I. Bosman, K.J. Lusthof, A.C. van Asten, J. Tytgat, R.M.A. Heeren, *Hydrogen peroxide effect on cocaine in users hair using imaging mass spectrometry* (talk), BLT Meeting, Brussels, Belgium, April 29, 2014.
17. E. Cuypers, B. Flinders, I. Bosman, K.J. Lusthof, A.C. van Asten, J. Tytgat, R.M.A. Heeren, *A closer look to the effect of external influences on cocaine in hair using imaging mass spectrometry* (poster), Analytical, Clinical and Forensic Toxicology Meeting, Bordeaux, France, June 10-14, 2014.
18. B. Flinders, E. Cuypers, H. Zeijlemaker, R.M.A. Heeren, *Preparation of longitudinal sections of hair samples for analysis by multi-modal mass spectrometry imaging* (poster), Analytical, Clinical and Forensic Toxicology Meeting, Bordeaux, France, June 10-14, 2014.
19. B. Hommersom, S.R. Ellis, T. Porta, M.C. Duursma, Y. Huang, S.R. Heron, D.R. Goodlett, R.M.A. Heeren, *Fundamental spray characteristics and complex formation using SAWN and other spray techniques* (talk), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
20. A.L. Bruinen, S.R. Ellis, E. Schioppa, J. Uher, R.M.A. Heeren, J. Visser, *Multimodal imaging for biological applications: X-ray microCT and mass spectrometry imaging* (talk), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
21. S.U.A.H. Syed, G.B. Eijkel, S.R. Ellis, D.F. Smith, R.M.A. Heeren, *Performance investigation and mass resolution enhancement of an Electrospray Ionization Quadrupole Mass Spectrometer with a position sensitive detector* (talk), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.

22. S.R. Ellis, R.M.A. Heeren, *Space- and Time-Resolved Detection of Ions and Neutrals in MALDI-TOF-MS Using an Active Pixel Detector* (talk), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
23. J. Driver, J. Amster, A. Kharchenko, R.M.A. Heeren, *Accurate Simulation of Image Charge Effects in Cylindrical and Harmonized FT-ICR Cells via Particle-in-Cell Method* (poster), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
24. T. Porta, S.R. Ellis, B. Hommersom, R.M.A. Heeren, *Active pixel detector: a new detection system for the characterization of native-like protein and DNA complexes by electrospray ionization* (poster), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
25. L. Jiang, K. Chugtai, T. Greenwood, Z. Bhujwalla, V. Raman, G.B. Eijkel, R.M.A. Heeren, K. Glunde, *Combining Magnetic Resonance Spectroscopic Imaging and Mass Spectrometric Imaging Reveals Protein Biomarkers of Aggressive Breast Cancer* (poster), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
26. D.F. Smith, A.M. Mckenna, Y.E. Corilo, R.P. Rodgers, A.G. Marshall, R.M.A. Heeren, *FT-ICR MS Imaging of Thin Layer Chromatograms of Crude Oil, Field Deposit, and Weathered Oil* (poster), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
27. G. Vladimirov, A. Kharchenko, R.M.A. Heeren, E. Nikolaev, *Investigation of image charge effects in electrostatic FT mass-analyzers by computer simulations* (poster), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
28. N.E. Mascini, A. Rizwan, L. Jiang, M. Cheng, K. Glunde, R.M.A. Heeren, *Mass Spectrometry Imaging of Breast Tumor Hypoxia Using 2-Nitroimidazoles as Chemical Markers* (poster), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.
29. K. Škrášková, G.B. Eijkel, M. Baes, P.P. van Veldhoven, S. de Munter, A. Khmelinskii, W.M. Abdelmoula, J. Dijkstra, R.M.A. Heeren, *Mass spectrometry imaging data co-registered with Allen Brain Atlas reveals the accumulation of fatty acids in the hindbrain of MFP-2 deficient mice* (poster), 62nd ASMS Conference on Mass Spectroscopy and Allied Topics, Baltimore, USA, June 15-19, 2014.

30. N.E. Mascini, *Probing the molecular heterogeneity of triple-negative breast cancer by mass spectrometry imaging* (talk), Johns Hopkins University School of Medicine, Baltimore, USA, July 2, 2014.
31. E. Cuypers, B. Flinders, I. Bosman, K.J. Lusthof, A.C. van Asten, J. Tytgat, R.M.A. Heeren, *Imaging mass spectrometry revealing the consequences of decontamination procedures in forensic hair analysis* (talk), Alternative Sampling Strategies in Toxicology and Therapeutic Drug Monitoring, Ghent, Belgium, September 18-19, 2014.
32. E. Cuypers, B. Flinders, I. Bosman, K.J. Lusthof, A.C. van Asten, J. Tytgat, R.M.A. Heeren, *Hydrogen peroxide reactions on cocaine in hair using imaging mass spectrometry* (poster), Alternative Sampling Strategies in Toxicology and Therapeutic Drug Monitoring, Ghent, Belgium, September 18-19, 2014.
33. S.R. Ellis, A.L. Bruinen, R.M.A. Heeren, *Direct Ion Imaging with Active Pixel Detectors* (poster), 22nd International Mass Spectrometry Conference, Geneva, Switzerland, September 24-28, 2014.
34. B. Flinders, E. Cuypers, R.M.A. Heeren, *Monitoring the distribution of drugs of abuse in longitudinal sectioned hair samples by multi-modal mass spectrometry imaging* (poster), 22nd International Mass Spectrometry Conference, Geneva, Switzerland, September 24-28, 2014.
35. T. Porta, S.R. Ellis, R.M.A. Heeren, *Direct visualization of intact protein ion beam focusing transmitted by an ion funnel using a position-sensitive detector at elevated pressure* (poster), 22nd International Mass Spectrometry Conference, Geneva, Switzerland, September 24-28, 2014.
36. A.L. Bruinen, *Multimodal imaging for biological applications: X-ray microCT and mass spectrometry imaging combined* (talk), NVMS Fall Meeting, Wageningen, the Netherlands, October 16, 2014.
37. E. Cuypers, B. Flinders, I. Bosman, K.J. Lusthof, A.C. van Asten, J. Tytgat, R.M.A. Heeren, *Hair analysis: contamination or use? The question finally resolved by imaging mass spectrometry?* (talk), TIAFT 2014, Buenos Aires, Argentina, November 9-13, 2014.
38. S.R. Ellis, *What can we learn by direct ion imaging in MALDI linear - ToF?* (talk), OurCon II, Antalya, Turkey, November 18-21, 2014.
39. M.J. Peffers, B. Cillero Pastor, G.B. Eijkel, P.D. Clegg, R.M.A. Heeren, *Time-of-flight secondary ion mass spectrometry-based molecular distribution distinguishing site specific distribution of lipids and small molecules* (poster), OurCon II, Antalya, Turkey, November 18-21, 2014.

40. T. Porta, S.R. Ellis, R.M.A. Heeren, *An active pixel detector used to image ion beam focusing properties of an ion funnel at elevated pressure without MCPs* (poster), OurCon II, Antalya, Turkey, November 18-21, 2014.

**c. Awards and recognitions**

1. S.R. Ellis, Winner of the Imabiotech Innovation in Mass Spectrometry Imaging Award.
2. S.R. Ellis, Winner of the BMSS Travel Award.
3. A.L. Bruinen, Winner of the NVMS Travel Award.
4. K. Škrášková, Best Presentation at NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.
5. M. Jansen, Poster Award at NVMS Anniversary Conference, Kerkrade, the Netherlands, April 14-15, 2014.

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. R.M.A. Heeren, Member, Editorial board of the international journal of mass spectrometry.
2. R.M.A. Heeren, Member, Editorial board of the journal of biomolecular mass spectrometry.
3. R.M.A. Heeren, Member, User proposal evaluation committee for PNNL-EMSL.
4. R.M.A. Heeren, Member, Scientific Advisory Board of the Warwick center for analytical sciences.
5. R.M.A. Heeren, Member, Management Committee of the EU-COST action BM1104.
6. R.M.A. Heeren, Member, Scientific advisory committee of the ECASIA 2013 conference on imaging MS.
7. R.M.A. Heeren, Member, Scientific advisory board of the 9<sup>th</sup> UPPCON conference on electron transfer and dissociation reactions.
8. R.M.A. Heeren, Member, International scientific committee of the 19<sup>th</sup> international SIMS meeting, Jeju, Korea.
9. R.M.A. Heeren, Member of the SAB Protea Biosciences.
10. R.M.A. Heeren, Member of the SAB ImaBioTech.

11. R.M.A. Heeren, Member of the SAB Omics2Image B.V.
12. R.M.A. Heeren, Treasurer of the International Mass Spectrometry Foundation.
13. R.M.A. Heeren, Co-founder of Omics2Image B.V.

### **3. Knowledge transfer (societal and economic)**

#### **a. Patents**

#### **b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. NPC II / UU (Heck).
2. TU Twente (Karperien).
3. EMC (van Beusekom).
4. DSM (Mengerink, Honing).
5. WUR (Nielen).
6. NKI (Wesseling).
7. URL (Sovago).
8. EMSL-Pacific Northwest National Laboratory (Paša-Tolić).
9. ULVAC-Physical Electronics (Bryan, Fischer).
10. Waters (Hoyes).
11. University of Zuerich (E. Brunner).
12. La Coruna University Hospital (Blanco-Garcia).
13. Johns Hopkins Medical School (Glunde).
14. University of Florida, Gainesville (Yost).
15. NSF-PIRE collaborations.
16. Janssen Pharmaceuticals (Cuyckens, Romijn).

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

## Group Y.L.A. Rezus 2014

### Fundings

Start-up AMOLF (Start-up)

NWO Topsector (TOPS)

### Employees

Niels Commandeur (technicus)	-
Giulia Giubertoni (stagiair)	-
Oleg Selig (OIO)	Start-up
Roel Siffels (stagiair)	-

## 1. Academic publications

### a. Peer reviewed Publications

### b. Publications in proceedings or other journals

### c. Contributions to scientific books (chapters or entire book)

### d. PhD theses

### e. Open Access publications

## 2. Invited lectures, posters, awards and other activities

### a. Invited lectures at international conferences and meetings

1. Y.L.A. Rezus, *Nonlinear infrared spectroscopy: from biomolecules to nanoantennas*, LH4 Seminar, ICFO, Barcelona, Spain, May 7, 2014.

### b. Other lectures and posters at (international) conferences and other scientific meetings

1. O. Selig, Y.L.A. Rezus, *2D IR spectroscopic investigation of elastin-like peptides* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. R. Siffels, Y.L.A. Rezus, *Nonlinear infrared spectroscopy of protein monolayers with plasmonic nanoantenna arrays* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
3. Y.L.A. Rezus, *Nonlinear infrared spectroscopy: molecular conformations and dynamics* (talk), TU Eindhoven, Eindhoven, the Netherlands, June 6, 2014.

4. O. Selig, M.B. van Eldijk, N. Smits, J.C.M. van Hest, Y.L.A. Rezus, *Structure in Disorder*, presentation, '2D IR spectroscopic investigation of elastin-like peptides (poster)', CMDS, Eugene, USA, July 13-16, 2014.
5. O. Selig, R. Siffels, Y.L.A. Rezus, *Ultrasensitive ultrafast vibrational spectroscopy in the near field of gold nanoantennas* (poster), CMDS, Eugene, USA, July 13-16, 2014.

**c. Awards and recognitions**

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

**3. Knowledge transfer (societal and economic)**

**a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. Nijmegen University (J. van Hest): Elastin-like peptides.
2. Unilever Vlaardingen (E. Pelan, S. Stoyanov) IPP 'Hybrid soft materials'.
3. TU Eindhoven (B. Meijer): 'BTA hydrogels'.

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

1. Labtour '*Telkens weer de regenboog ontrafelen*', AMOLF Open Day, October 4, 2014.

## Group E.C. Garnett 2014

### Fundings

Start-up AMOLF (Start-up)

FOM-Philips IPP Nanophotonics for Solid State Lighting (NSL)

FOM-Program Photosynthesis of nanomaterials (PHNA)

ERC Starting Grant (ERC)

NWO Topsector (TOPS)

### Employees

Gede Adhyaksa (OIO)	ERC
Annemarie Berkhout (stagiair)	-
Forrest Bradbury (gast)	-
Sarah Brittman (PD)	NSL
Jantina Fokkema (stagiair)	-
Lara Gardette (stagiair)	-
Michiel de Goede (stagiair)	-
Parisa Khoram (OIO)	ERC
Sander Mann (OIO)	Start-up
Sebastian Oener (OIO)	Start-up
Ingo van 't Oor (stagiair)	-
Beniamino Sciacca (PD)	ERC
Jia Wang (PD)	ERC

## 1. Academic publications

### a. Peer reviewed Publications

1. B. Sciacca, S.A. Mann, F.D. Tichelaar, H.W. Zandbergen, M.A. van Huis, E.C. Garnett, *Solution-phase epitaxial growth of quasi-monocrystalline cuprous oxide on metal nanowires*, Nano Lett. **14**, 5891-5898 (2014).

### b. Publications in proceedings or other journals

### c. Contributions to scientific books (chapters or entire book)

### d. PhD theses

### e. Open Access publications

## 2. Invited lectures, posters, awards and other activities

### a. Invited lectures at international conferences and meetings

1. E.C. Garnett, *Nanoscale Solar Cells: developing high-efficiency, low-cost photovoltaics*, SPIE Photonics Europe, Brussels, Belgium, April 14-17, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. B. Sciacca, E.C. Garnett, *Synthesis and characterization of AgFeS<sub>2</sub> nanowires for photovoltaics applications* (talk), MRS Spring Meeting, San Francisco, USA, April 21-25, 2015.
2. S.A. Mann, E.C. Garnett, *Subwavelength spectrum splitting for low-cost highly efficient photovoltaics* (talk), MRS Spring Meeting, San Francisco, USA, April 21-25, 2015.
3. S.Z. Oener, B. Sciacca, S.A. Mann, E.C. Garnett, *Solar highways – Photovoltaic measurements of metal@semiconductor nanowires* (talk), MRS Spring Meeting, San Francisco, USA, April 21-25, 2015.
4. B. Sciacca, E.C. Garnett, *Vertical metal-semiconductor core-shell nanowire arrays for large-scale photovoltaics* (poster), MRS Spring Meeting, San Francisco, USA, April 21-25, 2015.
5. B. Sciacca, E.C. Garnett, *Synthesis and characterization of earth abundant metal-semiconductor core-shell nanowires with a single crystalline shell for photovoltaics applications* (poster), MRS Spring Meeting, San Francisco, USA, April 21-25, 2015.
6. E.C. Garnett, *Nanoscale Solar Cells: developing high-efficiency, low-cost photovoltaics* (talk), Rice University, Houston, USA, May 6, 2014.
7. E.C. Garnett, *Nanoscale Solar Cells: developing high-efficiency, low-cost photovoltaics* (talk), Max Planck Institute for Coal Research, Muelheim an der Ruhr, Germany, May 19, 2014.
8. S.A. Mann, E.C. Garnett, *Nanophotonic spectral splitting* (poster), Gordon Research Conference on Plasmonics, Newry, USA, July 7-10, 2014.
9. S.A. Mann, *Nanophotonic spectrum splitting for low-cost, highly efficient photovoltaics* (poster), International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.
10. S.Z. Oener, *Au-Cu<sub>2</sub>O Core-Shell Nanowire Solar Cells* (poster), International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.
11. G. Adhyaksa, *Perovskite/Metal Synthesis, Characterization, and Single Nanowire Solar Cells* (poster), International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.

12. S.F. Brittman, *Organic-Inorganic Perovskites for Emission of Blue and Green Light* (poster), International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.
13. P. Khoram, *Core-shell Nanowire networks for solar cells application* (poster), International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.
14. B. Sciacca, *Core-shell nanowires for photovoltaics* (poster), International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.
15. J. Wang, *Vapor-liquid-solid (VLS) nanowire growth* (poster), International School Materials for Renewable Energy, Erice, Italy, July 12-18, 2014.
16. E.C. Garnett, *Nanoscale Solar Cells: developing high-efficiency, low-cost photovoltaics* (talk), Imperial College, London, UK, July 21-23, 2014.
17. J. Wang, *SnN<sub>2</sub> nanowire growth* (talk), 8th Nanowire Growth Workshop, Eindhoven, the Netherlands, August 25-29, 2014.
18. E.C. Garnett, *Solar Highways: core-shell nanowires for high-efficiency, low-cost solar conversion* (talk), E-MRS Fall Meeting, Warsaw, Poland, September 15-18, 2014.
19. E.C. Garnett, *Nanoscale Solar Cells: developing high-efficiency, low-cost photovoltaics*, EU PVSEC, Amsterdam, the Netherlands, September 22-26, 2014.
20. S.A. Mann, E.C. Garnett, *Nanophotonic spectrum splitting for low cost high-efficiency photovoltaics* (talk), MRS Fall Meeting, Boston, USA, November 30-December 5, 2014.
21. E.C. Garnett, S.Z. Oener, S.A. Mann, B. Sciacca, *Solar Highways: Metal-Semiconductor Core-Shell Nanowire Solar Cells* (talk), MRS Fall Meeting, Boston, USA, November 30-December 5, 2014.
22. E.C. Garnett, M. de Goede, *3D Imaging of the Internal Structure of Complex Nanomaterials in the SEM* (talk), MRS Fall Meeting, Boston, USA, November 30-December 5, 2014.
23. S.A. Mann, B. Sciacca, E.C. Garnett, *Quantitative Optical Absorption and Internal Quantum Efficiency Measurements on Single Nanowire Solar Cells* (talk), MRS Fall Meeting, Boston, USA, November 30-December 5, 2014.

### **c. Awards and recognitions**

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. E.C. Garnett, Member, Program committee, Physics@FOM 2015.
2. E.C. Garnett, Coordinator, EU Horizon 2020 proposal.

**3. Knowledge transfer (societal and economic)**

**a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

**Group V. Subramaniam 2014****Fundings**

Start-up AMOLF (Start-up)

FOM-Program Single-Molecule View on Protein Aggregation (SMPA)

**Employees**

Theresa Braun (stagiair)	-
Aditya Iyer (OIO)	SMPA
Leffert Lansink (stagiair)	-
Vova Shadchak (gast)	-
Niels Zijlstra (gast)	-

**1. Academic publications****a. Peer reviewed Publications**

1. A. Sidhu, I. Segers-Nolten, V. Subramaniam, *Solution conditions define morphological homogeneity of  $\alpha$ -Synuclein fibrils*, BBA Proteins Proteomics **1844**, 2127–2134 (2014).
2. H. Chaudhary, A.N.D. Stefanovic, V. Subramaniam, M.M.A.E. Claessens, *Membrane interactions and fibrillization of  $\alpha$ -synuclein play an essential role in membrane disruption*, FEBS Lett. **588**, 4457-4463 (2014).
3. M. Robotta, H.R. Gerding, A. Vogel, K. Hauser, S. Schildknecht, C. Karreman, M. Leist, V. Subramaniam, M. Drescher, *Alpha-Synuclein Binds to the Inner Membrane of Mitochondria in an  $\alpha$ -Helical Conformation*, ChemBioChem **15**, 2499–2502 (2014).
4. M.H.W. Stopel, C. Blum, V. Subramaniam, *Excitation spectra and stokes shift measurements of single organic dyes at room temperature*, J. Phys. Chem. Lett. **5**, 3259–3264 (2014).
5. P.J. Bosch, I.R. Correa, M.H. Sonntag, J. Ibach, L. Brunsveld, J.S. Kanger, V. Subramaniam, *Evaluation of fluorophores to label SNAP-tag fused proteins for multicolor single molecule tracking microscopy in live cells*, Biophys. J. **107**, 803-814 (2014).
6. P.J. Bosch, J.S. Kanger, V. Subramaniam, *Classification of dynamical diffusion states in single molecule tracking microscopy*, Biophys. J. **107**, 588-598 (2014).
7. A. Pereira, C. Tudor, P.-A. Pouille, S. Shekhar, J.S. Kanger, V. Subramaniam, E. Martin-Blanco, *Plasticity of the MAPK signaling network in response to mechanical stress*, PLoS One **9**, e101963 1-11 (2014).
8. S. Peter, M.B. Zell, C. Blum, A. Stuhl, K. Elgass, M. Sackrow, V. Subramaniam, A.J. Meixner, K. Harter, V.G. Maurino, F.E. Schleifenbaum, *Photosynthesis in a different light : spectro-microscopy for in vivo characterization of chloroplasts*, Front. Plant Sci. **292** 1-7 (2014).

9. A. Iyer, N.O. Petersen, M.M.A.E. Claessens, V. Subramaniam, *Amyloids of Alpha-Synuclein Affect the Structure and Dynamics of Supported Lipid Bilayers*, *Biophys. J.* **106**, 2585–2594 (2014).
10. A.N.D. Stefanovic, M.T. Stöckl, M.M.A.E. Claessens, V. Subramaniam,  *$\alpha$ -Synuclein oligomers distinctively permeabilize complex model membranes*, *FEBS J.* **281**, 2838–2850 (2014).
11. S.A. Semerdzhiev, D.R. Dekker, V. Subramaniam, M.M.A.E. Claessens, *Self-Assembly of Protein Fibrils into Suprafibrillar Aggregates: Bridging the Nano- and Mesoscale*, *ACS Nano* **8**, 5543–5551 (2014).
12. O.V. Severinovskaya, V.B. Kovalska, M.Y. Losytsky, V.V. Cherepanov, V. Subramaniam, S.M. Yarmoluk, *Application of MALDI-TOF mass spectrometry for study on fibrillar and oligomeric aggregates of alpha-synuclein*, *Biopolym. Cell* **30**, 190-196 (2014).
13. C. Tudor, J. te Riet, C. Eich, R. Harkes, N. Smisdom, J. Bouhuijzen Wenger, M. Ameloot, M. Holt, J.S. Kanger, C.G. Figdor, A. Cambi, V. Subramaniam, *Syntenin-1 and ezrin link Activated Leukocyte Cell Adhesion Molecule to the actin cytoskeleton*, *J. Biol. Chem.* **289**, 13445-13460 (2014).
14. N. Zijlstra, M.M.A.E. Claessens, C. Blum, V. Subramaniam, *Elucidating the Aggregation Number of Dopamine-Induced  $\alpha$ -Synuclein Oligomeric Assemblies*, *Biophys. J.* **106**, 440–446 (2014).
15. V.V. Shvadchak, V. Subramaniam, *A four amino-acid linker between repeats in the  $\alpha$ -synuclein sequence is important for fibril formation*, *Biochemistry* **53**, 279–281 (2014).
16. W.F. Rurup, F. Verbij, M.S.T. Koay, C. Blum, V. Subramaniam, J.J.L.M. Cornelissen, *Predicting the loading of virus-like particles with fluorescent proteins*, *Biomacromolecules* **15**, 558–563 (2014).

#### **b. Publications in proceedings or other journals**

#### **c. Contributions to scientific books (chapters or entire book)**

#### **d. PhD theses**

#### **e. Open Access publications**

### **2. Invited lectures, posters, awards and other activities**

#### **a. Invited lectures at international conferences and meetings**

1. V. Subramaniam, *Amyloid at the Nanoscale: Getting Grip on Alpha-Synuclein Amyloid Oligomers*, NanoBioEurope, Münster, Germany, June 2-4, 2014.

2. V. Subramaniam, *Coming to Grips with Amyloid Oligomers: Single Molecule Photobleaching Approaches*, OSA Optical Sensors, Barcelona, Spain, July 27-31, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. A. Iyer, M.M.A.E. Claessens, V. Subramaniam, *Alpha synuclein aggregation affects the structure and dynamics of supported lipid bilayers* (talk), KNAW Biophysics Meeting, Amsterdam, the Netherlands, January 28, 2014.
2. V. Subramaniam, *Amyloid at the Nanoscale* (talk), UvA IOP Colloquium, Amsterdam, the Netherlands, February 20, 2014.
3. V. Subramaniam, *Getting a grip on alpha-synuclein oligomers* (talk), Colloquium Universite Libre des Bruxelles, Brussels, Belgium, December 2, 2014.

**c. Awards and recognitions**

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. V. Subramaniam, Member, Board Dutch Physical Society.
2. V. Subramaniam, Member, Lorentz Center Physics Advisory Board.
3. V. Subramaniam, Member, FOM/v Committee.
4. V. Subramaniam, Member, VICI Committee.
5. V. Subramaniam, Member, TOP/ECHO Committee.
6. V. Subramaniam, Chair, Committee Indo-Dutch Joint Research Programme for ICT.
7. V. Subramaniam, Organizer, Workshop Amyloid Aggregation: Single Molecule Approaches to a Many Molecule Problem, Lorentz Center, Leiden, the Netherlands, April 13-17, 2015.

**3. Knowledge transfer (societal and economic)**

**a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

**Group G.H. Koenderink 2014****Fundings**

FOM-Program Mechanosensing and Mechanotransduction by Cells (MMC)  
 FOM-Program Spatial Design of Biochemical Regulation Networks (SPAT)  
 FOM-Program Leveraging the Mechanics of Responsive Networks (CMA)  
 FOM-DPI-TIFN IPP Multi-scale structure and mechanics of collagenous materials (BRM)  
 FOM/Profibrix MiniIPP (Profibrix)  
 NWO-VIDI (VIDI)  
 Van Gogh programme Frans/Nederlandse Akademie (Van Gogh)  
 NanoNextNL Program 5B Molecular Structure of Food (NN5B)  
 ERC Starting Grant (ERC)  
 Marie Curie IntraEuropean Fellowship (CytoAnchor)

**Employees**

Corianne van den Akker (OIO)	BRM
Celine Alkemade (stagiair)	-
Adeline Boire (PD)	CMA
Suzanne Detiger (gast)	-
Gesa Helms (gast)	-
Florian Huber (gast)	-
Karin Jansen (OIO)	MMC
Shayla Jansen (stagiair)	-
Marjolein Kuit-Vinkenoog (lab. assistent)	-
Nicholas Kurniawan (PD)	CytoAnchor
Stef van der Meulen (gast)	-
Tjado Morrema (stagiair)	-
Yuval Mulla (OIO)	ERC
Jeanette Nguyen (OIO)	NN5B
Magdalena Preciado Lopez (OIO)	SPAT
Faranaaz Rogier (stagiair)	-
Anis Senoussi (stagiair)	-
Stijn Sonneveld (stagiair)	-
Oscar Stassen (gast)	-
Agata Szuba (OIO)	ERC
Feng-Ching Tsai (OIO)	VIDI
Bart Vos (OIO)	BRM/CMA

## 1. Academic publications

### a. Peer reviewed Publications

1. I. Kirchenbuechler, D. Guu, N.A. Kurniawan, G.H. Koenderink, M.P. Lettinga, *Direct visualization of ow-induced conformational transitions of entangled F-actin solutions*, Nature Commun. **5**, 5060 1-5 (2014).
2. N.A. Kurniawan, J. Grimbergen, J. Koopman, G.H. Koenderink, *Factor XIII stiffens fibrin clots by causing fiber compaction*, J. Thromb. Haemostasis **12**, 1687-1696 (2014).
3. M. Preciado López, F. Huber, I. Grigoriev, M.O. Steinmetz, A. Akhmanova, G.H. Koenderink, M. Dogterom, *Actin-microtubule coordination at growing microtubule ends*, Nature Commun. **5**, 4778 1-9 (2014).
4. A.H. Lewis, I. Garlea, J. Alvarado, O.J. Dammone, P.D. Howell, A. Majumdar, B.M. Mulder, M.P. Lettinga, G.H. Koenderink, D.G.A.L. Aarts, *Colloidal liquid crystals in rectangular confinement : theory and experiment*, Soft Matter **10**, 7865-7873 (2014).
5. M. Soares e Silva, B. Stuhmann, T. Betz, G.H. Koenderink, *Time-resolved microrheology of actively remodeling actomyosin networks*, New J. Phys. **16**, 075010 1-21 (2014).
6. J. Alvarado, B.M. Mulder, G.H. Koenderink, *Alignment of nematic and bundled semiflexible polymers in cell-sized confinement*, Soft Matter **10**, 2329-2468 (2014).
7. M. Mavrikis, Y. Azou-Gros, F-C. Tsai, J. Alvarado, A. Bertin, F. Iv, A. Kress, S. Brasselet, G.H. Koenderink, T. Lecuit, *Septins promote F-actin ring formation by cross-linking actin filaments into curved bundles*, Nature Cell Biol. **16**, 322-334 (2014).
8. M. Atakhorrami, G.H. Koenderink, J.F. Paliarne, F.C. MacKintosh, C.F. Schmidt, *Scale-Dependent Nonaffine Elasticity of Semiflexible Polymer Networks*, Phys. Rev. Lett. **112**, 088101 1-5 (2014).

### b. Publications in proceedings or other journals

1. J. Alvarado, M. Sheinman, A. Sharma, F.C. MacKintosh, G.H. Koenderink, *Actieve vezelnetwerken : Van connectie tot contractie*, NTvN **80**, 8-11 (2014).
2. J. Alvarado, M. Sheinman, A. Sharma, F.C. MacKintosh, G.H. Koenderink, *Actieve vezelnetwerken : Van connectie tot contractie*, NTvN **80**, 40-43 (2014).

### c. Contributions to scientific books (chapters or entire book)

1. F.-C. Tsai, S. Roth, M. Dogterom, G.H. Koenderink, *Biomimetic liposome model systems to study cell shape control by the cytoskeleton*, **In**: Advances in Planar Lipid Bilayers and Liposomes, vol. 19 / ed. A. Iglic and C. Kulkarni. - Amsterdam: Elsevier, 2014. - pp. Chap. 6: 139-174

2. M. Preciado López, F. Huber, I. Grigoriev, M.O. Steinmetz, A. Akhmanova, M. Dogterom, G.H. Koenderink, *In vitro reconstitution of dynamic microtubules interacting with actin filament networks*, **In: Reconstituting the Cytoskeleton**. - San Diego: Academic Press, 2014. - pp. Chap. 17: 301-320 ( Methods in Enzymology; 540)
3. C.C. vandenAkker, M. Schleeger, M. Bonn, G.H. Koenderink, *Structural basis for the polymorphism of  $\beta$ -lactoglobulin amyloid-like fibrils*, **In: Bio-nanoimaging : Protein Misfolding & Aggregation** / ed. V. Uversky and Y. Lyubchenko. - Amsterdam: Elsevier AP, 2014. - pp. Part III, Chap. 31: 333-343
4. J. Alvarado, G.H. Koenderink, *Active mechanics of the cytoskeleton*, **In: Cell and Matrix Mechanics** / ed. R. Kaunas and A. Zemel. - Boca Raton: CRC Press, 2014. - pp. Chap. I: 1-34

#### **d. PhD theses**

1. F.-C. Tsai, *Cytoskeletal organization in biomimetic liposomes*, VU University Amsterdam, January 15, 2014.
2. C.C. van den Akker, *Amyloids: from molecular structure to mechanical properties*, VU University Amsterdam, October 2, 2014.

#### **e. Open Access publications**

1. I. Kirchenbuechler, D. Guu, N.A. Kurniawan, G.H. Koenderink, M.P. Lettinga, *Direct visualization of ow-induced conformational transitions of entangled F-actin solutions*, *Nature Commun.* **5**, 5060 1-5 (2014).
2. M. Preciado López, F. Huber, I. Grigoriev, M.O. Steinmetz, A. Akhmanova, G.H. Koenderink, M. Dogterom, *Actin-microtubule coordination at growing microtubule ends*, *Nature Commun.* **5**, 4778 1-9 (2014).

## **2. Invited lectures, posters, awards and other activities**

### **a. Invited lectures at international conferences and meetings**

1. G.H. Koenderink, *Active biopolymer networks*, Annual Berkeley Mini Statistical Mechanics Meeting, Berkeley, USA, January 10-12, 2014.
2. G.H. Koenderink, *Living soft matter: cytoskeletal self-organization by motor and polymerization forces*, American Physical Society March Meeting, Denver, USA, March 3-7, 2014.
3. G.H. Koenderink, *Cytoskeletal self-organization by motor pulling forces*, Company of Biologists Workshop, Sussex, UK, March 23-26, 2014.

4. G.H. Koenderink, *Self-organization of the cytoskeleton by motor and polymerization forces*, CECAM Workshop The Self-Organised Cytoplasm, Lausanne, Switzerland, July 16-18, 2014.
5. G.H. Koenderink, *Cytoskeletal organization by polymerization forces*, 9th Physics of Living Matter Symposium, Cambridge, UK, September 18-19, 2014.
6. G.H. Koenderink, *Cellular biophysics*, Symposium on Modern Biophysical Techniques for the Life Sciences, Brussels, Belgium, October 20-21, 2014.
7. G.H. Koenderink, *In vitro reconstitution of cytoskeletal coordination*, EMBO Workshop, Weizmann Institute Campus, Rehovot, Israel, October 27-31, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. F.-C. Tsai, G.H. Koenderink, *Physical interplay of the actin cytoskeleton and the membrane determines cell shape* (talk), Biochemistry Department, University of Geneva, Geneva, Switzerland, January 10, 2014.
2. C.C. van den Akker, G.H. Koenderink, *Amyloids: Connecting from single fibril mechanics to macroscopic rheology* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
3. F.-C. Tsai, G.H. Koenderink, *Physical interplay of the actin cytoskeleton and the membrane determines cell shape* (talk), Laboratoire Physico-Chimie, Institute Curie, Paris, France, January 22, 2014.
4. C.C. van den Akker, J. Nguyen, M. Schleegeer, K.P. Velikov, M. Bonn, G.H. Koenderink, *Amyloids: Connecting from single fibril mechanics to macroscopic rheology* (poster), Biophysical Society 58th Annual Meeting, San Francisco, USA, February 15-19, 2014.
5. G.H. Koenderink, *Living soft matter* (talk), Debye Institute, Utrecht, the Netherlands, February 21, 2014.
6. K.A. Jansen, G.H. Koenderink, *Fibrin origin mechanics and structure* (talk), Colloquium UPenn, Philadelphia, USA, March 6, 2014.
7. A. Szuba, F.-C. Tsai, M. Mavrakis, A. Bertin, G.H. Koenderink, *Linking to lipid membranes* (poster), Interdisciplinary Workshop on Cell Membranes, Paris, France, March 24-26, 2014.
8. K.A. Jansen, G.H. Koenderink, *Mechanics and Structure of Collagen Type I gels* (poster), NanoNextNL Meeting, Utrecht, the Netherlands, March 28, 2014.
9. G.H. Koenderink, *Living soft matter* (talk), FYSICA 2014, Leiden, the Netherlands, April 1, 2014.

10. F. Huber, M. Preciado López, G.H. Koenderink, M. Dogterom, *Actin-MT interactions result in mutual sensing and remodeling* (talk), DPG Spring Meeting 2014, Dresden, Germany, April 2, 2014.
11. G.H. Koenderink, *Actin and microtubules: bridging the divide* (talk), Life Simplified Symposium, Amsterdam, the Netherlands, April 4, 2014.
12. G.H. Koenderink, *Cytoskeletal self-organization by motor and polymerization forces* (talk), Laboratory of Theoretical Physics and Statistical Models, Universite Paris Sud, Paris, France, April 11, 2014.
13. N.A. Kurniawan, G.H. Koenderink, *Multiscale self-assembly of fibrin governs its polymerization kinetics, fiber and network structure, as well as nonlinear rheological properties* (talk), The Physics of Soft and Biological Matter, Cambridge, UK, April 14-16, 2014.
14. B.E. Vos, G.H. Koenderink, *Imaging the structure of fibrin gel in a marginally connected state* (poster), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
15. Y. Mulla, A. Szuba, G.H. Koenderink, *Building minimal cells to understand cell shape control* (poster), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
16. M. Preciado López, G.H. Koenderink, *Physical principles of actin-microtubule co-organization* (talk), EMBO Conference Microtubules, EMBL, Heidelberg, Germany, May 28-31, 2014.
17. F. Huber, G.H. Koenderink, M. Dogterom, *Microtubule modeling – linking tip fluctuations to dynamic instability* (poster), EMBO Conference Microtubules, EMBL, Heidelberg, Germany, May 28-31, 2014.
18. G.H. Koenderink, *Flow properties of biological polymer fluids* (talk), Physics of Fluids Group, University of Twente, Enschede, the Netherlands, June 12, 2014.
19. K.A. Jansen, *Creepy collagen networks* (talk), MechanoBiologyNL Meeting, Utrecht, the Netherlands, June 26, 2014.
20. Y. Mulla, A. Szuba, G.H. Koenderink, *Building minimal cells to understand cell shape control* (poster), Cosy Weekend, Odoorn, the Netherlands, June 27-29, 2014.
21. N.A. Kurniawan, G.H. Koenderink, *Fibrin fibers as bundles of protofibrils: Could substrate architecture matter in fibrinolysis?* (poster), International Congress on Fibrinolysis and Proteolysis, Marseille, France, July 6-9, 2014.
22. N.A. Kurniawan, *Bundling of fibrin fibrils governs clotting kinetics, fiber structure, and clot viscoelasticity* (talk), International Fibrinogen Workshop, Marseille, France, July 9-11, 2014.

23. N.A. Kurniawan, I.K. Piechocka, J. Grimbergen, J. Koopman, G.H. Koenderink, *Recombinant fibrinogen reveals the role of ligation and molecular heterogeneity in fibrin clot* (poster), International Fibrinogen Workshop, Marseille, France, July 9-11, 2014.
24. K.A. Jansen, G.H. Koenderink, *Deciphering the origin of fibrin network strain-stiffening* (talk), International Fibrinogen Workshop, Marseille, France, July 9-11, 2014.
25. B.E. Vos, G.H. Koenderink, *The mechanics of a fibrin gel: from microscale to macroscale* (talk), International Fibrinogen Workshop, Marseille, France, July 9-11, 2014.
26. A. Szuba, F.-C. Tsai, M. Mavrikakis, A. Bertin, G.H. Koenderink, *Linking actin cortex to the membranes using septins as crosslinkers* (poster), Biomembrane Days 2014, Berlin, Germany, September 1-3, 2014.
27. N.A. Kurniawan, G.H. Koenderink, *Dissecting the biophysics of blood clotting* (talk), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
28. K.A. Jansen, G.H. Koenderink, *Physics of Collagen gels* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
29. B.E. Vos, G.H. Koenderink, *Influence of strain on the mechanics of a fibrin gel* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
30. Y. Mulla, A. Szuba, G.H. Koenderink, *Building minimal cells to understand cell shape control* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
31. A. Szuba, F.-C. Tsai, M. Mavrikakis, A. Bertin, G.H. Koenderink, *Linking actin cortex to the membranes using septins as crosslinkers* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
32. F. Huber, G.H. Koenderink, M. Dogterom, *Microtubule modeling – linking tip fluctuations to dynamic instability* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
33. Y. Mulla, A. Szuba, G.H. Koenderink, *Building minimal cells to understand cell shape control* (poster), Physics of Cancer Conference, Leipzig, Germany, October 2-5, 2014.
34. G.H. Koenderink, *Amyloids: from molecular structure to mechanical properties* (talk), FOM-DPI-TIRN Bio(-related) Materials Day, Utrecht, the Netherlands, October 3, 2014.
35. B.E. Vos, G.H. Koenderink, *Influence of strain on the mechanics of a fibrin gel* (talk), FOM-DPI-TIRN Bio(-related) Materials Day, Utrecht, the Netherlands, October 3, 2014.

36. Y. Mulla, A. Szuba, G.H. Koenderink, *Building minimal cells to understand cell shape control* (poster), CECAM Summer School, Stuttgart, Germany, October 6-10, 2014.
37. N.A. Kurniawan, G.H. Koenderink, *Forces and restraints: a bottom-up approach to studying cell shape* (poster), 1st BioSoft Symposium, Forschungszentrum Jülich, Jülich, Germany, November 6, 2014.
38. K.A. Jansen, G.H. Koenderink, *Physics of Collagen gels* (talk), Nijmegen, the Netherlands, November 21, 2014.
39. G.H. Koenderink, *Hierarchical mechanics of biological polymers* (talk), Soft Matter Symposium, Amsterdam, the Netherlands, November 27, 2014.

### **c. Awards and recognitions**

#### **d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

### **3. Knowledge transfer (societal and economic)**

#### **a. Patents**

#### **b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. Unilever, regelmatig overleg i.v.m. samenwerking binnen FOM-DPI-TIFN IPP.
2. Friesland Campina. Advies geleverd over het opzetten van microreologie experimenten voor food products en beschikbaar stellen lab voor gezamenlijke experimenten.

#### **c. Performances on television, radio or at public events**

1. C.C. van den Akker, *Protein nanofibrils for biomaterials and food industry*, TEDx Event, lab tour and demonstration, June 19, 2014, AMOLF, Amsterdam, the Netherlands.

#### **d. Publications in public magazines, newspapers or on the internet**

1. J. Alvarado, M. Sheinman, A. Sharma, F.C. MacKintosh, G.H. Koenderink, *Actieve vezelnetwerken: van connectie tot contractie*, *Nederlands Tijdschrift voor Natuurkunde* **80** (2014).
2. G.H. Koenderink, *Van spaghettislierten naar haarspelde*, [www.kennislink.nl](http://www.kennislink.nl), October 10, 2014.

3. G.H. Koenderink, *Verf in close-up: Modelsysteem maakt werking van shear-thinning vloeistoffen duidelijk*, [www.c2w.nl](http://www.c2w.nl), October 10, 2014.
4. G.H. Koenderink, *De werking van verfroeren ontdekt*, [www.schildersvak.nl](http://www.schildersvak.nl), October 14, 2014.
5. Y. Mulla, *Zoektocht naar de kunstmatige cel*, Technasium Magazine, nummer 8, 2014.

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

1. G.H. Koenderink, Supervision of Profielwerkstuk *De artificiele cel*, S. Pruijssers and C. Doelman, Atheneum College Hageveld, Haarlem, the Netherlands, January 2014.
2. G.H. Koenderink, *Biofysica: natuurkunde van de levende cel*, Guest lecture, Jan van Egmond Lyceum, Purmerend, the Netherlands, April 22, 2014.
3. G.H. Koenderink, *Physics of the living cell*, Lecture, Rotary Club, Amsterdam, the Netherlands, November 17, 2014.
4. G.H. Koenderink, Master Course *Soft Condensed Matter and Biological Physics*, VU University & University of Amsterdam, December, 2014.

## Group B.M. Mulder 2014

### Fundings

FOM-Program Spatial Design of Biochemical Regulation Networks (SPAT)  
NWO Topsector (TOPS)

### Employees

Bandan Chakraborty (OIO)	-
Takis Foteinopoulos (OIO)	-
Ioana Garlea (OIO)	SPAT
Valerie Notenboom (gast)	-

## 1. Academic publications

### a. Peer reviewed Publications

1. P. Foteinopoulos, B.M. Mulder, *The effect of anisotropic microtubule-bound nucleations on ordering in the plant cortical array*, Bull. Math. Biol. **76**, 2907-2922 (2014).
2. J. de Keizer, B.M. Mulder, M.E. Janson, *Microtubule networks for plant cell division*, Syst. Synth. Biol. **8**, 187-194 (2014).
3. A.H. Lewis, I. Garlea, J. Alvarado, O.J. Dammone, P.D. Howell, A. Majumdar, B.M. Mulder, M.P. Lettinga, G.H. Koenderink, D.G.A.L. Aarts, *Colloidal liquid crystals in rectangular confinement : theory and experiment*, Soft Matter **10**, 7865-7873 (2014).
4. J. Alvarado, B.M. Mulder, G.H. Koenderink, *Alignment of nematic and bundled semiflexible polymers in cell-sized confinement*, Soft Matter **10**, 2329-2468 (2014).
5. S.H. Tindemans, E.E. Deinum, J.J. Lindeboom, B.M. Mulder, *Efficient event-driven approach to simulating microtubule dynamics in the plant cortical array*, Frontiers Biophys. **2**, 19: 1-15 (2014).

### b. Publications in proceedings or other journals

### c. Contributions to scientific books (chapters or entire book)

### d. PhD theses

### e. Open Access publications

## **2. Invited lectures, posters, awards and other activities**

### **a. Invited lectures at international conferences and meetings**

1. B.M. Mulder, *Taking Directions*, EMBO Conference Microtubules, EMBL, Heidelberg, Germany, May 28-31, 2014.
2. B.M. Mulder, *Taking Directions*, Physics and Biological Systems 2014, Gif-sur-Yvette, France, June 24-27, 2014.

### **b. Other lectures and posters at (international) conferences and other scientific meetings**

1. I.C. Garlea, S. Roth, M. Dogterom, B.M. Mulder, *The mechanical interplay between a membrane and enclosed filamentous polymers* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. I.C. Garlea, S. Roth, M. Dogterom, B.M. Mulder, *Microtubules vs membrane: the mechanical interplay leads to mutual deformations* (talk), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
3. B.M. Mulder, *Why are (most) plants long and thin?* (talk), Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, May 14, 2014.
4. I.C. Garlea, S. Roth, M. Dogterom, B.M. Mulder, *The mechanical interplay between cytoskeletal filaments and the enclosing cell membrane as a driver for spatial organization of cells* (poster), Physics and Biological Systems 2014, Gif-sur-Yvette, France, June 24-27, 2014.

### **c. Awards and recognitions**

### **d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. B.M. Mulder, Associate Editor *Frontiers in Biophysics*.

## **3. Knowledge transfer (societal and economic)**

### **a. Patents**

### **b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

1. Gero Steinberg (Exeter): Nucleopore distributions in fungi.
2. David Erhardt (Stanford): Light-induced microtubule reorientation in plants.

3. Chris Staiger (Indiana): Actin length distributions in plants.
4. Wageningen University (M. Janson): Nuclear positioning in yeast.
5. Wageningen University (Ben Scheres): Cell development.
6. Vrije Universiteit Amsterdam (Joost Hulshof): Diffusional transport.

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

1. B.M. Mulder, *Head-on collisions with complexity*, PhD course Systems Biology, Wageningen University, February 27, 2014.
2. B.M. Mulder, *Randomness*, Onderwijsmodule in EZO-23306 'Modeling Biological Systems', Wageningen University, November, 2014.
3. B.M. Mulder, *ToolBox lectures "Cycles and Chaos" and "Models of epidemics"*, in EZO-23306 'Modeling Biological Systems', Wageningen University, November, 2014.

## Group P.R. ten Wolde 2014

### Fundings

FOM-Program Spatio-temporal patterns of membrane protein activity (PMP)  
FOM-Program Expanding society's toolbox to harvest solar energy (BF) & FOM-Program DNA in Action (DNAA)  
FOM-Shell Program Computational Science for Energy Research (CSER)  
FOM-Projectruimte The robust ticking of a circadian clock (PR10)  
FOM-Projectruimte The thermodynamics of biochemical information processing (PR13)  
NWO-VICI (VICI)

### Employees

Chris Govern (PD)	VICI
Yao Li (PD)	PMP
Giulia Malaguti (PD)	PR13
Michele Monti (OIO)	BF
Joris Pajmans (OIO)	PR10
Adithya Vijaykumar (OIO)	CSER

## 1. Academic publications

### a. Peer reviewed Publications

1. C.C. Govern, P.R. ten Wolde, *Energy Dissipation and Noise Correlations in Biochemical Sensing*, Phys. Rev. Lett. **113**, 258102 1-5 (2014).
2. C.C. Govern, P.R. ten Wolde, *Optimal resource allocation in cellular sensing systems*, PNAS **111**, 17486-17491 (2014).
3. M. Wehrens, P.R. ten Wolde, A. Mugler, *Positive feedback can lead to dynamic nanometer-scale clustering on cell membranes*, J. Chem. Phys. **141**, 205102 1-15 (2014).
4. T.E. Ouldridge, P.R. ten Wolde, *The robustness of proofreading to crowding-induced pseudo-processivity in the MAPK pathway*, Biophys. J. **107**, 2425-2435 (2014).
5. J. Pajmans, P.R. ten Wolde, *Lower bound on the precision of transcriptional regulation and why facilitated diffusion can reduce noise in gene expression*, Phys. Rev. E **90**, 032708 1-14 (2014).
6. W.H. de Ronde, P.R. ten Wolde, *Multiplexing oscillatory biochemical signals*, Phys. Biol. **11**, 026004 1-11 (2014).
7. K. Kaizu, W.H. de Ronde, J. Pajmans, K. Takahashi, F. Tostevin, P.R. ten Wolde, *The Berg-Purcell limit revisited*, Biophys. J. **106**, 976-985 (2014).

### b. Publications in proceedings or other journals

**c. Contributions to scientific books (chapters or entire book)**

1. P.R. ten Wolde, A. Mugler, *Importance of crowding in signaling, genetic, and metabolic networks*, In: *New Models of the Cell Nucleus : Crowding, Entropic Forces, Phase Separation, and Fractals* / ed. R. Hancock and K.W. Jeon. - San Diego: Elsevier AP, 2014. - pp. Chap. 12: 419-442. - ( *International Review of Cell and Molecular Biology*; 307)

**d. PhD theses**

**e. Open Access publications**

1. C.C. Govern, P.R. ten Wolde, *Optimal resource allocation in cellular sensing systems*, *PNAS* **111**, 17486-17491 (2014).
2. W.H. de Ronde, P.R. ten Wolde, *Multiplexing oscillatory biochemical signals*, *Phys. Biol.* **11**, 026004 1-11 (2014).

**2. Invited lectures, posters, awards and other activities**

**a. Invited lectures at international conferences and meetings**

1. P.R. ten Wolde, *Fundamental Limits to Cellular Sensing*, Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
2. P.R. ten Wolde, *Protein clustering enhances signaling fidelity*, Seminar The Versatile Action of Noise: Applications from Genetic to Neural Circuits, Bremen, Germany, June 22-27, 2014.
3. P.R. ten Wolde, *Fundamental Limits to Cellular Sensing*, Seminar The Versatile Action of Noise: Applications from Genetic to Neural Circuits, Bremen, Germany, June 22-27, 2014.
4. P.R. ten Wolde, *Fundamental Limits to Cellular Sensing*, Annual Meeting of the Society for Mathematical Biology and Japanese Society for Mathematical Biology, Osaka, Japan, July 28-August 1, 2014.
5. P.R. ten Wolde, *Rare Switching Events in Non-Stationary and Non-Markovian Systems*, Lorentz Workshop Fluctuations in Population Biology, Epidemiology and Evolution, Leiden, the Netherlands, August 11-15, 2014.
6. P.R. ten Wolde, *Fundamental Limits to Cellular Sensing*, Physics Meets Biology, University of Oxford, Oxford, UK, September 3-5, 2014.

7. P.R. ten Wolde, *Fundamental Limits to Cellular Sensing*, Fluctuations in small complex systems II, Venice, Italy, October 9-13, 2014.
8. P.R. ten Wolde, *Fundamental Limits to Cellular Sensing*, Paris Biological Physics Community Day, Paris, France, November 7, 2014.
9. T.R. Sokolowski, J. Paijmans, M. Wehrens, L. Bossen, T. Miedema, K. Kazunari, K. Takahashi, P.R. Ten Wolde, *eGFRD in all dimensions*, Workshop Particle-Based Stochastic Reaction-Diffusion Models in Biology, Banff International Research Station (BIRS), Banff, Canada, November 9-14, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. P.R. ten Wolde, *Fundamental Limits to the Precision of Chemical Sensing* (talk), Eindhoven University, Eindhoven, the Netherlands, January 6, 2014.
2. P.R. ten Wolde, *Fundamental Limits to the Precision of Chemical Sensing* (talk), the Institute of Science and Technology, Klosterneuburg, Austria, January 31, 2014.
3. P.R. ten Wolde, *Fundamental Limits to the Precision of Chemical Sensing* (talk), University of Oxford, Oxford, UK, February 4, 2014.
4. T.R. Sokolowski, N.B. Becker, P.R. ten Wolde, *Stable gap gene patterns without morphogen gradients*, Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
5. J. Paijmans, P.R. ten Wolde, *The coupling between the circadian clock and the cell cycle* (poster), Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
6. C.C. Govern, P.R. ten Wolde, *Fundamental limits on the precision of cellular sensing* (talk), Albert Einstein College of Medicine, New York, USA, March, 2014.
7. C.C. Govern, P.R. ten Wolde, *Fundamental limits on the precision of cellular sensing* (talk), Rutgers University, Camden, USA, March, 2014.
8. J. Paijmans, *The coupling between the circadian clock and the cell cycle* (talk), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
9. M. Monti, P.R. ten Wolde, *Time perception in Cyanobacteria* (poster), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.

10. A. Vijaykumar, P.R. ten Wolde, *Simulating reaction-diffusion systems on a micro- and a mesoscopic level* (poster), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
11. P.R. ten Wolde, *Fundamental Limits to the Precision of Chemical Sensing* (talk), Imperial College, London, UK, April 24, 2014.
12. P.R. ten Wolde, *Optimal Resource Allocation in Chemical Sensing* (talk), John Innes Center, Norwich, UK, May 20, 2014.
13. J. Paijmans, *The Intricate Coupling between the circadian clock and the cell cycle* (talk), The Eight q-bio Summer School, Albuquerque, USA, July 28-August 12, 2014.
14. P.R. ten Wolde, *Fundamental Limits to Cellular Sensing* (talk), Riken Institute, Osaka, Japan, July 30, 2014.
15. P.R. ten Wolde, *Optimal Resource Allocation in Cellular Sensing* (talk), Tokyo University, Tokyo, Japan, August 4, 2014.
16. J. Paijmans, *The Intricate Coupling between the circadian clock and the cell cycle* (poster), The Eight q-bio Conference, Santa Fe, USA, August 13-16, 2014.
17. M. Monti, P.R. ten Wolde, *Time perception in Cyanobacteria* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
18. J. Paijmans, *The Intricate Coupling between the circadian clock and the cell cycle* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.

### **c. Awards and recognitions**

### **d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. P.R. ten Wolde, Member, Jury dr. H.P. Heinekenprijzen.
2. P.R. ten Wolde, Member, Advisory Board for the European Center for Mathematics, Physics and their Interactions (CEMPI).
3. P.R. ten Wolde, Member, Scientific Committee of the International Scientific Coordination Network (GDRI) on Evolution, Regulation and Signaling (ERS).
4. P.R. ten Wolde, Member, International Advisory Committee of StoMP, a collaborative research network between mathematical modellers and microbiologists in the UK.

5. P.R. ten Wolde, Member, Lorentz Center Computational Science Advisory Board.
6. P.R. ten Wolde, Member, Lorentz Center Physics Advisory Board.

### **3. Knowledge transfer (societal and economic)**

#### **a. Patents**

#### **b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects** Microsoft Research Cambridge (Stephen Emmott).

1. Shell, CSER project, Contact Person Albert Jansen.

#### **c. Performances on television, radio or at public events**

#### **d. Publications in public magazines, newspapers or on the internet**

1. *Hoe een bacterie voedsel vindt*, KennisLink, December 24, 2014.

#### **e. Other professional products (software, prototypes, etc.)**

1. Website [www.GFRD.org](http://www.GFRD.org), describing our algorithm Green's Function Reaction Dynamics, and from where the algorithm can be downloaded.

### **Outreach**

1. P.R. ten Wolde, *Biochemisch Netwerken*, Popular Lecture, Unitas, Utrecht, the Netherlands, June 4, 2014.

**Group S.J. Tans 2014****Fundings**

FOM-Program Spatial Design of Biochemical Regulation Networks (SPAT)

FOM-Program Single Molecule Protein Aggregation (SMPA)

FOM-Projectruimte (PR)

NWO-VICI (VICI)

ALW

NOW-complexity

**Employees**

Mario Avellaneda Sarrio (OIO)	VICI
Sergey Bezrukavnikov (OIO)	SMPA
Dmitry Ershov (PD)	VICI
Sebastiaan Gude (OIO)	NOW-complexity
Arif Kamal (PD)	ALW
David Minde (PD)	SMPA
Fatemeh Moayed (OIO)	personal funding
Rutger Rozendaal (stagiair)	-
Vanda Sunderlikova	VICI
Noreen Walker (OIO)	SPAT
Martijn Wehrens (OIO)	VICI
Roeland van Wijk (OIO)	VICI

**1. Academic publications****a. Peer reviewed Publications**

1. A. Mugler, S.J. Tans, A. Mashaghi, *Circuit topology of self-interacting chains : implications for folding and unfolding dynamics*, Phys. Chem. Chem. Phys. **16**, 22537-22544 (2014).
2. D.J. Kiviet, P. Nghe, N. Walker, S. Boulineau, V. Sunderlikova, S.J. Tans, *Stochasticity of metabolism and growth at the single-cell level*, Nature **514**, 376-379 (2014).
3. A. Mashaghi, S. Mashaghi, S.J. Tans, *Misfolding of Luciferase at the Single-Molecule Level*, Angew. Chem., Int. Ed. **25**, 10390-10393 (2014).
4. A. Mashaghi, R.J. van Wijk, S.J. Tans, *Circuit topology of proteins and nucleic acids*, Structure **22**, 1227-1237 (2014).
5. S. Bezrukavnikov, A. Mashaghi, R.J. van Wijk, Ch. Gu, L.J. Yang, Y.Q. Gao, S.J. Tans, *Trehalose facilitates DNA melting : a single-molecule optical tweezers study*, Soft Matter **10**, 7269-7277 (2014).

6. K.M. Taute, S. Gude, P. Nghe, S.J. Tans, *Evolutionary constraints in variable environments, from proteins to networks*, Trends Genet. **30**, 192-198 (2014).
7. M. Kogenaru, S.J. Tans, *An improved Escherichia coli strain to host gene regulatory networks involving both the AraC and LacI inducible transcription factors*, J. Biol. Eng. **8**, 2 1-5 (2014).
8. A. Mashaghi, G. Kramer, D.C. Lamb, M.P. Mayer, S.J. Tans, *Chaperone action at the single-molecule level*, Chem. Rev. **114**, 660-676 (2014).

**b. Publications in proceedings or other journals**

**c. Contributions to scientific books (chapters or entire book)**

**d. PhD theses**

**e. Open Access publications**

**2. Invited lectures, posters, awards and other activities**

**a. Invited lectures at international conferences and meetings**

1. S.J. Tans, *Stochasticity cellular growth*, Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
2. S.J. Tans, *Experimental evolution and epistasis in variable environments*, APS Meeting, Denver, USA, March 3, 2014.
3. S.J. Tans, *Variability in metabolism and growth*, STOB Conference, Vienna, Austria, May 4-8, 2014.
4. S.J. Tans, *Experimental evolution and epistasis in variable environments*, Heraeus Conference on Mechanisms, Strategies, and Evolution of Microbial Systems, Bad Honnef, Germany, June 15-19, 2014.
5. S.J. Tans, *Stochasticity in cellular metabolism and growth*, Cold Spring Harbor Asia Meeting on Quantitative Biology, Suzhou, China, October 12-17, 2014.
6. S.J. Tans, *Evolution of regulatory systems in variable environments*, Symposium Evolution of Gene Regulation, London, UK, November 3-4, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. K.M. Taute, S.J. Tans, T.S. Shimizu, *Costs and benefits of flagellar motility* (poster), Gordon Research Conference on Sensory Transduction in Microorganisms, Ventura, USA, January 11-17, 2014.
2. K.M. Taute, S.J. Tans, T.S. Shimizu, *Costs and benefits of flagellar motility* (poster), Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
3. M. Wehrens, P.R. ten Wolde, A. Mugler, *Positive feedback and clustering: Positive feedback leads to dynamic nano-scale spatial clustering on cell membranes* (poster), Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
4. N. Walker, P. Nghe, S.J. Tans, *Gene expression noise & growth fluctuations* (poster), Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
5. S. Bezrukavnikov, A. Mashaghi, G. Kramer, M.P. Mayer, B. Bukau, S.J. Tans, *The interaction between DnaK chaperone system and client protein studied at the single molecule level* (poster), Biophysical Society Meeting, San Francisco, USA, February 15-19, 2014.
6. S.J. Tans, *Regulatory evolution and metabolic stochasticity in E. coli cells* (talk), Ecole Polytechnique, Paris, France, March 20, 2014.
7. K.M. Taute, S.J. Tans, T.S. Shimizu, *Bacterial Motility strategies: Quo vadis, E. coli?* (talk), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
8. S.J. Tans, *Variability in expression and metabolism in single bacterial cells* (talk), Wageningen University, Wageningen, the Netherlands, May 20, 2014.
9. A. Mashagi, F. Moayed, A. Kamal, S.J. Tans, *How does HtpG affect the folding pathway of Luciferase? Optical tweezers answers* (poster), Cold Spring Harbor Laboratory, Cold Spring, USA, May, 2014.
10. S.J. Tans, *Chaperone-guided protein folding at the single-molecule level* (talk), Chemistry Department, University of Cambridge, Cambridge, UK, June 6, 2014.
11. D.P. Minde, *Revisiting Hsp70-assisted protein folding* (talk), Cosy Weekend, Odoorn, the Netherlands, June 27-29, 2014.

12. M. Wehrens, S.J. Tans, *Probing single cell growth and metabolism: Do E. coli care about metabolic noise* (poster), The Eight q-bio Conference, Santa Fe, USA, August 13-16, 2014.
13. N. Walker, P. Nghe, S.J. Tans, *Gene expression noise – how much is explained by growth rate fluctuations?* (poster), The Eight q-bio Conference, Santa Fe, USA, August 13-16, 2014.
14. K.M. Taute, S.J. Tans, T.S. Shimizu, *A novel high-throughput method for tracking bacteria in 3D* (talk), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
15. S. Gude, *Motility and growth of E. coli* (talk), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
16. S. Bezrukavnikov, R.J. van Wijk, A. Mashaghi, E. Claij, H.-J. Boluit, S.J. Tans, *A low-drift heating method for optical tweezers* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
17. M. Wehrens, S.J. Tans, *Probing single cell growth and metabolism: Do E. coli care about metabolic noise* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
18. A. Mashaghi, S. Bezrukavnikov, D.P. Minde, G. Kramer, M. Mayer, S.J. Tans, D.P. Minde, *Hsp70-substrate interactions revisited using single molecule optical tweezers* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
19. F. Moayed, A. Kamal, S.J. Tans, *How small Hsps suppress protein aggregation, A single-molecule investigation* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
20. R.J. van Wijk, A. Mashagi, S.J. Tans, *Relating Proteins with Circuit Topology* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
21. S. Gude, K.M. Taute, T.S. Shimizu, S.J. Tans, *Motility and growth* (poster), Joint Annual Meeting BES-SEF, Lille, France, December 10, 2014.

### **c. Awards and recognitions**

### **d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

## **3. Knowledge transfer (societal and economic)**

### **a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

1. NRC Handelsblad, *Toeval bepaald de groei van identieke bacterieen*, June 9, 2014.
2. NRC Handelsblad, *De toekomst van de computer zit in koolstof nanobuisjes*, August 31, 2014.

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

## Group T.S. Shimizu 2014

### Fundings

FOM-Program The Signal is the Noise (NOISE)

FOM-Program Crowd management (CROWD)

FOM-Projectruimte (PR)

Paul G. Allen Family Foundation - Allen Distinguished Investigator (ADI) Award

NWO-VIDI (VIDI)

### Employees

Tessa Averink (stagiair)	-
Sharon Bakker (stagiair)	-
Oskar Bles (stagiair)	-
Simone Boskamp (lab. assistent)	-
Robin Doornekamp (stagiair)	-
Sebastian Gude (OIO)	
Stephen Helms (PD)	VIDI
Bram Henneman (stagiair)	-
Keita Kamino (PD)	ADI
Johannes Keegstra (OIO)	PR
Milena Lazova (OIO)	SPAT
Esther Lohrmann (stagiair)	-
Jacopo Solari (OIO)	CROWD
Katja Taute (PD)	VIDI

## 1. Academic publications

### a. Peer reviewed Publications

1. K.M. Taute, S. Gude, P. Nghe, S.J. Tans, *Evolutionary constraints in variable environments, from proteins to networks*, Trends Genet. **30**, 192-198 (2014).

### b. Publications in proceedings or other journals

### c. Contributions to scientific books (chapters or entire book)

### d. PhD theses

### e. Open Access publications

## 2. Invited lectures, posters, awards and other activities

### a. Invited lectures at international conferences and meetings

1. T.S. Shimizu, *Bacterial chemotactic strategies: design and physical implementation*, Modelling Cellular Systems Workshop, Heidelberg, Germany, October 1, 2014.

**b. Other lectures and posters at (international) conferences and other scientific meetings**

1. K.M. Taute, S.J. Tans, T.S. Shimizu, *Costs and benefits of flagellar motility* (poster), Gordon Research Conference on Sensory Transduction in Microorganisms, Ventura, USA, January 11-17, 2014.
2. T.S. Shimizu, *Bacterial chemotaxis strategies: Experimental dissection of signaling and behavior* (talk), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
3. K.M. Taute, S.J. Tans, T.S. Shimizu, *Costs and benefits of flagellar motility* (poster), Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
4. S.J. Helms, L. Avery, G.J. Stephens, T.S. Shimizu, *A Quantitative Model of the Motility of Multiple Nematode Species Reveals Low-Dimensional Variation in Exploratory Behavior* (poster), Workshop Physics of Evolution, Regulation, and Signaling, Munich, Germany, February 10-12, 2014.
5. S.J. Helms, L. Avery, G.J. Stephens, T.S. Shimizu, *A Quantitative Model of Motility Reveals Low-Dimensional Variation in Exploratory Behavior Across Multiple Nematode Species* (talk), Dutch Worm Meeting, Groningen, the Netherlands, February 20, 2014.
6. S.J. Helms, L. Avery, G.J. Stephens, T.S. Shimizu, *Identifying Behavioral Strategies by Comparing Quantitative Phenotypes*, contributed (talk), American Physical Society March Meeting, Denver, USA, March 3-7, 2014.
7. S.J. Helms, L. Avery, G.J. Stephens, T.S. Shimizu, *Identifying Behavioral Strategies through Large-Scale Phenotyping and Statistical Analysis* (talk), SURFsara Data & Computing Infrastructure Event, Amsterdam, the Netherlands, March 12, 2014.
8. S.J. Helms, L. Avery, G.J. Stephens, T.S. Shimizu, *Identifying Behavioral Strategies through Large-Scale Phenotyping and Statistical Analysis* (talk), Internet2 Global Summit, Denver, USA, April 8, 2014.
9. K.M. Taute, S.J. Tans, T.S. Shimizu, *Bacterial Motility strategies: Quo vadis, E. coli?* (talk), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
10. J.M. Keegstra, *Influence of network topology on cell-to-cell variability in bacterial chemotaxis* (talk), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
11. J. Solari, *3D tracking of photoactivated fluorescent proteins in live bacteria* (talk), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.

12. T.S. Shimizu, *In vivo biophysics: from molecules to cells and organisms* (talk), Kavli Institute for Bionanoscience, Technical University Delft, Delft, the Netherlands, June 27, 2014.
13. J. Solari, *In vivo imaging of Nucleoid Associated Proteins (NAP)* (talk), UVA-AMOLF-VU Summer School, Drenthe, the Netherlands, June 27-29, 2014.
14. J. Solari, *In vivo imaging of Nucleoid Associated Proteins (NAP)* (talk), FOM Meeting Cellular Crowding, Groningen, the Netherlands, July 2, 2014.
15. J.M. Keegstra, *Influence of network topology on cell-to-cell variability probed by single cell FRET* (talk), The Eight q-bio Summer School, Albuquerque, USA, July 28-August 12, 2014.
16. J.M. Keegstra, *Influence of network topology on cell-to-cell variability* (poster), The Eight q-bio Conference, Santa Fe, USA, August 13-16, 2014.
17. S. Gude, K.M. Taute, T.S. Shimizu, S.J. Tans, *Motility and growth* (poster), Complexity Meeting, The Hague, the Netherlands, September 18, 2014.
18. T.S. Shimizu, *In vivo biophysics: from molecules to cells and organisms* (talk), Department of Physics and Astronomy, VU University Amsterdam, Amsterdam, the Netherlands, September 23, 2014.
19. K.M. Taute, S.J. Tans, T.S. Shimizu, *A novel high-throughput method for tracking bacteria in 3D* (talk), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
20. S.J. Helms, L. Avery, G.J. Stephens, T.S. Shimizu, *From the Ballistic to Diffusive Transition, A Model of Nematode Motility Reveals Low-Dimensional Variation in Exploratory Behavior Across Species* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
21. J. Solari, *3D tracking of photoactivated fluorescent proteins in live bacteria* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
22. J.M. Keegstra, *Influence of network topology on cell-to-cell variability* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
23. S. Gude, *Motility and growth of E. coli* (talk), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
24. K. Kamino, *Relating phenotypic individuality to molecular-level individuality in bacterial chemotaxis* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.

25. S.J. Helms, *Discovering Simplicity in Complexity: Using Statistics, Machine Learning, and Dynamical Modeling to Study Noisy Real-World Systems*, invited (talk), Amsterdam University College Faculty Research Night, Amsterdam, the Netherlands, November 18, 2014.
26. T.S. Shimizu, *What can bacteria teach us about nematode motility?* (talk), Neural Dynamics Forum, University of Bristol, Bristol, UK, December 5, 2014.
27. S. Gude, K.M. Taute, T.S. Shimizu, S.J. Tans, *Motility and growth* (poster), Joint Annual Meeting BES-SEF, Lille, France, December 10, 2014.

**c. Awards and recognitions**

**d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

1. T.S. Shimizu, Member, Program Committee, The Eighth q-bio Conference, Santa Fe, USA, August 13-16, 2014.
2. T.S. Shimizu, Member, National Steering Committee, NL-BioImaging AM.
3. T.S. Shimizu, Program Leader, FOM Program The signal is the Noise: Physical origins of fluctuations in organism-scale behavior (NOISE).
4. T.S. Shimizu, Organizer (jointly with Greg Stephens, VU), KNAW Biophysics Meetings (4 events per year).

**3. Knowledge transfer (societal and economic)**

**a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

1. T.S. Shimizu, *How bacteria do their Math*, an invited lecture for Molecular Biophysics Course, Leiden University, Leiden, the Netherlands, November 28, 2014.

- 
2. T.S. Shimizu, *Physical Biology of the Cell* (jointly with Prof. E. Peterman, VU), a full semester undergraduate course at Amsterdam University College, September-December, 2014.

## Group J.S. van Zon 2014

### Fundings

Start-up AMOLF (Start-up)

FOM-Program The Signal is the Noise (NOISE)

NWO-VIDI (VIDI)

ERC Starting Grant (ERC)

Human Frontiers Science Program Career Development Award (HFSP)

### Employees

Nicola Gritti (OIO) ERC

Guizela Huelsz-Prince (OIO) ERC

Simone Kienle (PD) ERC

Yvonne Goos (lab. assistent) -

## 1. Academic publications

### a. Peer reviewed Publications

### b. Publications in proceedings or other journals

### c. Contributions to scientific books (chapters or entire book)

### d. PhD theses

### e. Open Access publications

## 2. Invited lectures, posters, awards and other activities

### a. Invited lectures at international conferences and meetings

### b. Other lectures and posters at (international) conferences and other scientific meetings

1. S. Kienle, N. Gritti, J.S. van Zon, *Quantitative timelapse microscopy of stochastic cell fate decisions in C. elegans* (poster), Physics@FOM 2014, Veldhoven, the Netherlands, January 21-22, 2014.
2. S. Kienle, N. Gritti, J.S. van Zon, *AC/VU decision in C. elegans – An ideal model system to study stochastic cell fate decisions* (poster), Physical Biology Circle Meeting, Dresden, Germany, April 23-25, 2014.
3. S. Kienle, N. Gritti, J.S. van Zon, *Quantitative Timelapse Microscopy of Stochastic Cell Fate Decisions in C. elegans* (poster), European C. elegans Meeting, Berlin, Germany, May 15-17, 2014.

4. J.S. van Zon, *Robustness and canalization in C. elegans vulva development* (talk), Developmental Biology Seminar Group, Cancer Research UK London Research Institute, London, UK, June 10, 2014.
5. J.S. van Zon, *Robustness and canalization in C. elegans vulva development* (talk), Imperial College, London, UK, June 10, 2014.
6. J.S. van Zon, *Robustness and canalization in C. elegans vulva development* (talk), Engineering Life Symposium, Delft, the Netherlands, June 11, 2014.
7. N. Gritti, S. Kienle, J.S. van Zon, *Rolling dice during development: Timelapse microscopy of stochastic cell fate decisions in C. elegans* (talk), The Eight q-bio Summer School, Albuquerque, USA, July 28-August 12, 2014.
8. N. Gritti, S. Kienle, J.S. van Zon, *Rolling dice during development: Timelapse microscopy of stochastic cell fate decisions in C. elegans* (talk), The Eight q-bio Conference, Santa Fe, USA, August 13-16, 2014.
9. N. Gritti, S. Kienle, J.S. van Zon, *Rolling dice during development: Timelapse microscopy of stochastic cell fate decisions in C. elegans* (poster), The Eight q-bio Conference, Santa Fe, USA, August 13-16, 2014.
10. S. Kienle, N. Gritti, J.S. van Zon, *Quantitative Timelapse Microscopy of Stochastic Cell Fate Decisions in C. elegans* (poster), EMBO Practical Course: Microscopy, Modeling and Biophysical Methods, Heidelberg, Germany, September 08-20, 2014.
11. S. Kienle, N. Gritti, J.S. van Zon, *Quantitative Timelapse Microscopy of Stochastic Cell Fate Decisions in C. elegans* (poster), DutchBiophysics, Veldhoven, the Netherlands, September 29-30, 2014.
12. J.S. van Zon, *Disorganized organizers: robustness and canalization in C. elegans vulva development* (talk), Developmental Biology Seminar Series, Gurdon Institute, London, UK, October 14, 2014.

### **c. Awards and recognitions**

1. Guizela Huelsz-Prince, Shell Afstudeerprijs voor Natuurkunde.

### **d. Board/Committee positions in congress organizations, scientific consortia, advisory councils, international panels, editorships at journals**

## **3. Knowledge transfer (societal and economic)**

### **a. Patents**

**b. Contacts with industry (including consultancy or other functions), new business activity resulting from projects**

**c. Performances on television, radio or at public events**

**d. Publications in public magazines, newspapers or on the internet**

**e. Other professional products (software, prototypes, etc.)**

**Outreach**

