

Dr. ir. Bas G. P. van Ravensteijn

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I am interested in the development, understanding, and implementation of new functional materials *via* a bottom-up approach. For this, I methodically combine synthetic polymer, colloid, and physical chemistry. This combination enables me to translate and leverage fundamental concepts for the rapid and rational design of new (colloidal) materials with emerging properties. I thrive in a multidisciplinary environment where insights from various scientific fields and backgrounds fuel my curiosity and creativity. My straightforward, pragmatic approach and willingness to help are appreciated for their effectiveness in reaching overarching team goals.

Research experience

Nov 2018 – Present **Junior scientist** at the Materials Solutions department of the Netherlands Organisation for Applied Scientific Research (TNO), Eindhoven, The Netherlands

Aug 2016 – Aug 2018 **Postdoctoral researcher** at the Department of Chemical Engineering, Material Research Laboratory, Mitsubishi Center for Advanced Materials, University of California – Santa Barbara, Santa Barbara, United States

Project 1: *Development of next generation rheological modifiers*

Project 2: *Synthesis and assembly of well-defined star polymers*

Nov 2015 – July 2016 **Postdoctoral researcher** at the Van 't Hoff Laboratory for Physical and Colloid Chemistry, Utrecht University, Utrecht, The Netherlands

Project: *Synthesis of thermo-responsive, arbitrarily shaped colloids using stop-flow lithography*

2011 – 2015 **Ph.D. researcher** at the Van 't Hoff Laboratory for Physical and Colloid Chemistry, Utrecht University, Utrecht, The Netherlands

Thesis: *Isotropic & patchy colloids with engineered surface functionality*
Supervisor: Prof. Willem Kegel

June – Sept 2011 **Intern at Icopal and Capzo**, Groningen, The Netherlands

Industrial internship: *Development of encapsulated fire retardants for bitumen roofing applications*

Supervisors: Frits Zandvoort (Icopal), Dr. Joris Salari (Capzo), Dr. Judith van Wijk (Eindhoven University of Technology, Eindhoven)

2010 – 2011 **Master student** at the Polymer Chemistry Group, Eindhoven University of Technology, Eindhoven, The Netherlands

Master thesis: *Preparation of epoxidized macro-monomers via CCTP and their ring opening polymerization behavior*

Supervisors: Dr. Hans Heuts, Dr. Rob Duchateau, Dr. Gemma Sanders

May – June 2009 **Bachelor student** at the Department of Chemistry and Polymer Science, Stellenbosch University, Stellenbosch, South-Africa

Bachelor thesis: *Colloidosomes from sterically stabilized particles*

Supervisors: Dr. Joris Salari and Prof. Bert Klumperman

Education

2011 – 2015 **Ph.D. in Physical and Colloid Chemistry**
Utrecht University, Utrecht, The Netherlands

2009 – 2011 **Master of Science in Chemistry and Chemical Engineering: Molecular Engineering** (Focus: Polymer & Organic Chemistry, cum laude)
Eindhoven University of Technology, Eindhoven, The Netherlands

2006 – 2009 **Bachelor of Science in Chemistry and Chemical Engineering**
Eindhoven University of Technology, Eindhoven, The Netherlands

2000– 2006 **Atheneum (subjects include Chemistry, Physics, Mathematics and Biology)**
Bisschoppelijk College, Weert, The Netherlands

Mentoring and teaching experience

- Daily guidance of Ph.D. student at the Van 't Hoff Laboratory. Provided input for experimental design, data interpretation based on the results obtained from my Ph.D. project and guidance during manuscript writing
- Supervision and experimental design of research projects for master (1 year) and bachelor (3 months) students in Chemistry (Utrecht University)
- Supervision and experimental design for (honors) undergraduate students (6 months) in Chemical Engineering (University of California – Santa Barbara)
- Practical courses for Chemistry and Pharmacy students (Utrecht University)
- Tutorial classes Physical Chemistry and Soft Condensed Matter (Utrecht University)

Miscellaneous skills, qualifications and courses

- Languages: Dutch (native), English (fluent), writing and presenting in (scientific) English
- IT skills: Microsoft Office, ChemDraw, Origin, Mathematica, SasView, MestReNova
- **2013** Graduate Research Seminar on Polymer Colloids, Shanghai, China
- **2012, 2013** Han-sur-Lesse Winterschool on Physical Chemistry, Han-sur-Lesse, Belgium
- **2012** International School of Physics "Enrico Fermi": Physics of Complex Colloids, Varenna, Italy
- **2011** Condensed course on Emulsion Polymerization, Eindhoven, The Netherlands

Scientific appendix

Description of Ph.D.: *Isotropic & patchy colloids with engineered surface functionality*

My project focused on developing new polymeric colloidal systems that self-assemble into well-defined superstructures. I established new synthetic strategies to prepare colloids that are anisotropic in shape and surface chemistry. The chemical functionalities on these particles allow for site-specific introduction of chemical complexity to tune the inter-colloidal interactions and trigger their assembly. Surface modifications based on Atom Transfer Radical Polymerization were routinely used. The chemistry of the grafted polymers was tailored to guide the physical behavior of the resulting particles. With this strategy, I developed colloidal systems which display, e.g., thermo-reversible and fuel-mediated clustering.

Key research techniques and skills

- Colloidal synthesis (emulsion, dispersion polymerizations)
- Controlled polymer synthesis (ATRP, SET-LRP, CCTP, RAFT)
- Molecular analysis methods (IR, SEC, SEC-MALS, NMR, XPS, GC-MS, MALDI)
- Rheology & viscometry
- Dynamic & static light scattering (DLS, SLS)
- Small angle neutron scattering (SANS)
- Electron microscopy (TEM)
- Optical/fluorescence microscopy

Rewards

- **DeWolfe Distinguished Teaching Fellow Award** in recognition of excellence in teaching, June **2018**, University of California – Santa Barbara.
- Experimental time (5 days) awarded at the **Center for Neutron Research, National Institute of Standards**, April **2018**, Gaithersburg, United States.
- **Dow Material Institute / Material Research Laboratory (MRL) Travel Fellowship**, June **2017**
- **Best oral presentation** during Graduate Research Seminar (part of International Polymer and Colloids Group Meeting), June **2013**, Shanghai, China.

Patents

- B. G. P. van Ravensteijn, R. Bou Zerdan, N. Cadirov, D. J. Seo, J. Gerbec, J. Israelachvili, C. J. Hawker, M. E. Helgeson, Hyper-branched macromolecular architectures and methods of use, *US Patent App. 16/025,741* **2019**.

Publications

- J. M. Ren, A. S. Knight, B. G. P. van Ravensteijn, P. Kohl, R. Bou Zerdan, Y. Li, D. J. Lunn, A. Abidilla, G. G. Qiao, C. J. Hawker, DNA-inspired strand-exchange to switch synthetic supramolecular assemblies. *J Am. Chem. Soc.* **2019**, *141*, 2630.
- B. G. P. van Ravensteijn, R. Bou Zerdan, D. Seo, N. Cadirov, J. A. Gerbec, C. J. Hawker, J. N. Israelachvili, M. E. Helgeson, Triple function lubricant additives based on organic-inorganic hybrid star polymers. *ACS Appl. Mater. Interfaces* **2019**, *11*, 1363.
- B. G. P. van Ravensteijn, R. Bou Zerdan, M. E. Helgeson, C. J. Hawker, Minimizing star-star coupling in Cu(0) mediated controlled radical polymerizations. *Macromolecules* **2019**, *52*, 601.

- S. Ouhajji, B. G. P. van Ravensteijn, C. Fernández-Rico, K. S. Lacina, A. P. Philipse, A. V. Petukhov, Wet-chemical synthesis of chiral colloids. *ACS Nano*, **2018**, 12, 12089.
- B. G. P. van Ravensteijn, W. E. Hendriksen, R. Eelkema, J. H. van Esch, W. K. Kegel, Fuel-mediated transient clustering of colloidal building blocks. *J. Am. Chem. Soc.* **2017**, 139, 9763.
- Y. Guo, B. G. P. van Ravensteijn, C. H. J. Evers, W. K. Kegel, pH reversible encapsulation of oppositely charged colloids mediated by polyelectrolytes. *Langmuir* **2017**, 33, 4551.
- B. G. P. van Ravensteijn, N. Vilanova, I. de Feijter, W. K. Kegel, I. K. Voets, Temperature-induced, selective assembly of supramolecular colloids in water. *ACS Omega* **2017**, 2, 1720.
- B. G. P. van Ravensteijn, W. K. Kegel, Tuning particle geometry of chemically anisotropic dumbbell-shaped colloids. *J. Colloid Interface Sci.* **2017**, 490, 462.
- B. G. P. van Ravensteijn, D.-J. Schild, W. K. Kegel, R. J. M. Klein Gebbink, The immobilization of a transfer hydrogenation catalyst on colloidal particles. *ChemCatChem*. **2017**, 9, 440.
- B. G. P. van Ravensteijn, W. K. Kegel, Versatile procedure for site-specific grafting of polymer brushes on patchy particles via ATRP. *Polym. Chem.* **2016**, 7, 2858.
- B. G. P. van Ravensteijn, Isotropic and patchy colloids with engineered surface functionality, Ph.D. thesis, **2015**. (<https://dspace.library.uu.nl/bitstream/1874/323670/1/vRavensteijn.pdf>).
- B. G. P. van Ravensteijn, W. K. Kegel, Colloids with continuously tunable surface charge. *Langmuir* **2014**, 30, 10590.
- B. G. P. van Ravensteijn, M. Kamp, A. van Blaaderen, W. K. Kegel, General route toward chemically anisotropic colloids. *Chem. Mater.* **2013**, 25, 4348.
- G. C. Sanders, B. G. P. van Ravensteijn, R. Duchateau, J. P. A. Heuts, The unexpected behaviour of epoxidised macromonomers derived from catalytic chain transfer during ring opening copolymerisation. *Polym. Chem.* **2012**, 3, 2200.

- I. Rehor, C. Maslen, R. van Alst, B. G. P. van Ravensteijn, S. de Beer, P. Moerman, H. B. Eral, W. K. Kegel, Hydrogel microcrawlers steered by light. *Submitted* **2019**.
- Y. Guo, B. G. P. van Ravensteijn, W. K. Kegel, Dimple colloids with tunable cavity size and surface functionalities. *Submitted* **2019**.
- F. Chang, B. G. P. van Ravensteijn, K. S. Lacina, W. K. Kegel, Bi-functional Janus spheres with chemically orthogonal patches. *Submitted* **2018**.
- Y. Guo, B. G. P. van Ravensteijn, C. H. J. Evers, W. K. Kegel, Self-assembly of isotropic colloids into one-dimensional aggregates. *In prep.*
- B. G. P. van Ravensteijn, R. Bou Zerdan, C. J. Hawker, M. E. Helgeson, Solution behavior of p(SMA-co-MMA) based viscosity modifiers. *In prep.*

Posters and oral presentations

- **Invited lecture** DSM, Geleen, September **2018** – *Well-defined star polymers via Cu(0)-mediated controlled radical polymerization.*
- **Invited lecture** Delft University of Technology, Delft, May **2018** – *Star polymer synthesis via Cu(0)-mediated controlled radical polymerization.*
- **Invited lecture** UCSB/Korea Mini-symposium, Santa Barbara, March **2018** – *Towards the rational design of next generation lubricant additives.*
- **Invited lecture** DSM, Geleen, January **2018** – *Isotropic & patchy colloids with engineered surface functionality.*

- ACS Colloids & Interface Science Symposium, New York, July **2017** – Poster: *Identifying the role of macromolecular architecture in the viscosity modification of lubrication oils by star polymers.*
- **Invited lecture** University of California – Santa Barbara, Santa Barbara, June **2016** – *Isotropic & patchy colloids with engineered surface functionality.*
- ACS Colloids & Interface Science Symposium, Boston, June **2016** – Presentation: *Fuel-driven clustering of colloidal building blocks.*
- CHemistry As Innovating Science; Dutch national chemistry conference, Veldhoven, November **2015** – Presentation: *Dissipative aggregation of colloidal building blocks.*
- CHemistry As Innovating Science; Dutch national chemistry conference, Veldhoven, November **2014** – Presentation: *Thermo-responsive colloids: Towards directional & reversible interactions.*
- ACS Colloids & Interface Science Symposium, Philadelphia, June **2014** – Presentation: *Versatile anisotropic colloidal platform and its first steps towards reversible, directional interactions.*
- Physics@FOM; Dutch national physics conference, Veldhoven, January **2014** – Poster: *A general route towards chemically anisotropic colloids.*
- International Soft Matter Conference **2013**, Rome, September 2013 – Poster: *A general route towards chemically anisotropic colloids.*
- Graduate Research Seminar (International Polymer Colloids Group), June **2013**, Shanghai – Presentation: *Emulsion-based synthesis of chemically anisotropic dumbbell-shaped colloids.*
- International Polymer and Colloids Group Meeting, Shanghai, June **2013** – Poster: *Chemically anisotropic dumbbells: A model system for self-assembly.*
- NWO CW group meeting “Chemistry in Relation to Physics and Materials Sciences”, Veldhoven, February **2013** – Poster: *Engineering colloidal interactions via metal-mediated bond formation.*
- International School of Physics "Enrico Fermi": Physics of Complex Colloids, Varenna, July **2012** – Poster: *Shape & chemically anisotropic colloids: A model system for self-assembly.*