

## Dr. ir. Bas G.P. van Ravensteijn

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I am interested in the synthesis of molecular/colloidal systems for the formation of new materials via a bottom-up approach. I believe that combining synthetic polymer chemistry and physical chemistry will lead to development of engineered building blocks that provide the basis for new (colloidal) assemblies. The strong combination of chemistry and physics allows for fundamental understanding of self-assembly processes as well as the creation of new hybrid functional materials. For example, in my PhD project I employed controlled radical polymerizations to tune interactions between colloidal particles for self-assembly purposes. I am willing to further develop my skills and knowledge of controlled polymerization and to employ these techniques in different fields of chemistry and/or physics, such as micro-fluidics and rheology.

### Research experience

**Sept 2016 – Present**      **Postdoctoral researcher at Chemical Engineering & Material Research Laboratory, University of California – Santa Barbara, Santa Barbara, United States**

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

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

PhD project: *Isotropic and patchy colloids with engineered surface functionality*

Supervisor: Professor Willem K. 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 W. O. Salari (Capzo) and Dr. Judith van Wijk (Eindhoven University of Technology, Eindhoven)

**2010 – 2011**                **Master student at Polymer Chemistry (SPC), Eindhoven University of Technology, Eindhoven, The Netherlands**

Master thesis: *Preparation of epoxidized macro-monomers using catalytic chain transfer polymerization and their ring opening polymerization behavior*

Supervisors: Dr. J. P. A. (Hans) Heuts, Dr. Rob Duchateau and Dr. Gemma C. Sanders

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

Bachelor thesis: *Colloidosomes composed of sterically stabilized colloidal particles*

Supervisors: Dr. Joris W. O. Salari and Professor Bert Klumperman

## Education

- 2010 – 2015**      **PhD in Physical and Colloid Chemistry**  
Utrecht University, Utrecht, The Netherlands
- 2009 – 2011**      **Master of Science in Chemistry and Chemical Engineering: Molecular Engineering 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

## Teaching experience

- Supervision of research projects for master (1 year) and bachelor (3 months) students in Chemistry
- Practical classes (various experiments and projects) for bachelor students Chemistry and Pharmacy students
- Tutorial classes Physical Chemistry for bachelor students Chemistry
- Tutorial classes Soft Condensed Matter for master students Chemistry and Physics
- Additional tutorials in Chemistry and Mathematics for high school students

## Miscellaneous skills, qualifications and courses

- Languages:      Dutch (native), English (fluent)
- **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 PhD project: *Isotropic and patchy colloids with engineered surface functionality*

My project focused on the development of new colloidal systems that self-assemble into well-defined superstructures. We developed a synthetic strategy to prepare colloids that are anisotropic in shape and chemistry. The chemical functionalities on these particles are handles that allow for the introduction of chemical complexity via a wide variety of chemistries. These surface modifications induced interactions between the colloidal particles which trigger their self-assembly. During the project, surface alternations based on Atom Transfer Radical Polymerization were used frequently. The properties of the grafted polymer brush were used to guide the physical behavior of the colloidal particles. With this strategy, we were able to prepare colloidal systems which showed thermo-reversible and dissipative aggregation.

Key research techniques and skills

- Organic synthesis
- Colloidal synthesis (emulsion and dispersion polymerizations)
- Controlled radical polymerizations (ATRP, SET-LRP, CCTP)
- Electron microscopy (TEM)
- Optical/fluorescence microscopy
- Molecular analysis methods (IR, GPC, NMR, XPS, GC-MS, MALDI)
- Dynamic & Static light scattering
- Viscometry / Rheology

Publications

- 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*, 9763–9766.
- 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*, 4551–4558.
- 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*, 1720–1730.
- B. G. P. van Ravensteijn, W. K. Kegel, Tuning particle geometry of chemically anisotropic dumbbell-shaped colloids. *J. Colloid Interface Sci.* **2017**, *490*, 462–477.
- 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*, 440–450.
- B. G. P. van Ravensteijn, W. K. Kegel, Versatile procedure for site-specific grafting of polymer brushes on patchy particles via Atom Transfer Radical Polymerization (ATRP). *Polym. Chem.* **2016**, *7*, 2858–2869.
- B. G. P. van Ravensteijn, Isotropic and patchy colloids with engineered surface functionality, PhD Thesis, Utrecht University, **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*, 10590–10599.
- B. G. P. van Ravensteijn, M. Kamp, A. van Blaaderen, W. K. Kegel, General route toward chemically anisotropic colloids. *Chem. Mater.* **2013**, *25*, 4348–4353.
- 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*, 2200–2208.
- S. Ouhajji, B. G. P. van Ravensteijn, C. Fernández Rico, A. P. Philipse, A. P. Petukhov, Bulk synthesis of chiral colloids. *Subm.*
- Y. Guo, B. G. P. van Ravensteijn, W. K. Kegel, Cavity size control, surface functionalization and applications of dimple particles. *In Prep.*
- Y. Guo, B. G. P. van Ravensteijn, C. H. J. Evers, W. K. Kegel, Self-assembly of one-dimensional aggregates from spherical colloids with hydrophobic attractions and electrostatic repulsion. *In Prep.*
- B. G. P. van Ravensteijn, R. Bou Zerdan, A. Melker, A. Anastasaki, M. W. Schulze, C. J. Hawker, Reducing star-star coupling via Cu(0)-mediated reversible-deactivation radical polymerization. *In Prep.*
- B. G. P. van Ravensteijn, R. Bou Zerdan, N. Cadirov, D. J. Seo, J. Gerbec, J. Israelachvili, C. J. Hawker, M. E. Helgeson, A triple-function motor oil additive. *In Prep.*
- I. Rehor, C. Malsen, R. van Aalst, B. G. P. van Ravensteijn, S. de Beer, P. Moerman, H. B. Eral, W. K. Kegel, Hydrogen microcrawlers steered by light. *In Prep.*

## Posters and oral presentations

- 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 – Presentation: *Isotropic and 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 (CHAINS); Dutch national chemistry conference, Veldhoven, November 2015 – Presentation: *Dissipative aggregation of colloidal building blocks.*
- CHemistry As Innovating Science (CHAINS); Dutch national chemistry conference, Veldhoven, November 2014 – Presentation: *Colloids with thermo-responsive hairs: 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 (ISMC) 2013, Rome, September 2013 – Poster: *A general route towards chemically anisotropic colloids.*

- Graduate Research Seminar (part of International Polymer and Colloids Group Meeting), 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.*

#### Rewards

- Best oral presentation of the conference during Graduate Research Seminar (part of International Polymer and Colloids Group Meeting), June 2013, Shanghai.
- Dow Material Institute (DowMI) / Material Research Laboratory (MRL) Travel Fellowship, June 2017