

Prof. Per B. Zetterlund 講演会

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“Control of Morphology of Polymer Particles and
Graphene-Based Polymeric Nanomaterials
via Emulsion-Based Approaches”

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Control of Morphology of Polymer Particles and Graphene-Based Polymeric Nanomaterials via Emulsion-Based Approaches

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Abstract

Polymeric nano-objects find a wide variety of applications in e.g. material science, health care products and nanomedicine [1]. The traditional focus has been on spherical particles, simply because this geometry is by far the most accessible from a synthesis perspective. In recent years there has been renewed focus on synthesis of non-spherical and hollow polymeric (nano)particles, motivated by the interesting properties and functional applications of such materials. The properties and applications of polymer particles can be further expanded by incorporation of non-polymeric materials such as graphene - single-layer graphene is the strongest material known to man, and this is accompanied by a range of other extraordinary physical properties. This presentation will describe our recent progress in the general areas outlined above, focusing on the use of miniemulsions combined with approaches based on templating, as well as the use of low pressure CO₂ as an environmentally friendly and versatile tool to exert influence on heterogeneous polymerization systems. Specific examples include synthesis of hollow particles via CO₂-assisted photo-initiated polymerization using surfactant vesicles templates [2], as well as novel synthetic routes to graphene-based polymeric nanocomposite particles of specific morphology [3].

References

- [1] P. B. Zetterlund, S. C. Thickett, S. Perrier, E. Bourgeat-Lami, M. Lansalot, *Chem. Rev.*, 2015, 115, 9745.
- [2] S. Dong, P. T. Spicer, F. P. Lucien, P. B. Zetterlund, *Soft Matter*, 2015, 11, 8613.
- [3] S. C. Thickett, N. Wood, Y. H. Ng, P. B. Zetterlund, *Nanoscale*, 2014, 6, 8590.

Biographical Details



Prof Per Zetterlund is co-director of the Centre for Advanced Macromolecular Design (CAMD) at the University of New South Wales (UNSW) in Sydney, Australia. His research is primarily concerned with synthesis of polymer and polymeric nanoparticles using radical polymerization techniques in a wide variety of heterogeneous polymerization systems. The focus lies on kinetic/mechanistic understanding, with a view to develop novel means of preparing polymeric nanoparticles in more efficient (*e.g.* environmentally friendly approaches based on the use of CO₂) and specific manners (*e.g.* tailor-made nanoparticles with specific features/properties, incl. the use of graphene oxide as surfactant). Another important area of research is the development of fundamental understanding of radical polymerization in nanoreactors for enhanced control over the polymer microstructure, as well as monomer sequence distribution control via multiblock copolymer synthesis. Prof Zetterlund has published 162 peer-reviewed papers.