Janus Discs
Andreas Walther, Markus Drechsler and Axel H. E. Müller
Lehrstuhl für Makromolekulare Chemie II and Bayreuther Zentrum für Kolloide und Grenzflächen, Universität Bayreuth, D-95440 Bayreuth, Germany

4 Step procedure
Template synthesis of Janus structures via microphase separated terblock copolymers

- Crosslinking of the inner polystyrene layer of the bulk morphology of the SBT terpolymers and subsequent sonication until a semiturbid solution is reached.
- Acidic hydrolysis of the tert-butyl groups and step-wise dialysis from dioxane into water.
- Investigation of the solution properties via a triblock terpolymer template.
- Synthesis of novel sheet-like Janus structures.

Acidic hydrolysis of the tert-butyl groups and step-wise dialysis from dioxane into water.

Solution properties and Imaging

- Exponential decay of particle size with sonication duration for higher sonication amplitudes.
- Circular flat particles with strong aggregation tendency.
- Flat particles with high aspect ratio.

Multicompartment Character

- Embedding of discs • Rapid evaporation
- Back-to-back stacked superstructures with internal compartmentalisation.

Self-Assembly

- Cryo-TEM in THF
- Cryo-TEM in THF shows layered structures, demonstrating back-to-back stacking of the particles.
- Fascinating and unexpected aggregation patterns even in good organic solvents.

Surface activity

- Pandant drop method
- Significant decrease of the interfacial tension for the sheet-like Janus structures.
- Highly surface-active novel class of materials.

Conclusion

- Successful synthesis of novel disc-like Janus particles.
- Size of the particles can be tuned by sonication duration and intensity.
- Non-hydrolyzed Janus structures show aggregation in good organic solvents.
- Multicompartment structure can be shown with TEM.
- Size-dependent decrease of the oil/water interfacial tension.

Acknowledgments

This work is supported by the SONS-AMPHI and MC RTN Polyamphi research network programs.
A. Walther acknowledges support from the Bavarian Elite Network Program "Macromolecular Science", as well as scholarship from the Bavarian Elite Support Program.
We appreciate Georg Kneuss, Robert Magerle, Volker Abetz, Astrid Göpfert, Sabine Wunder and Holger Schnedl for fruitful discussions and their contributions to this work.

Introduction

AIM

- Synthesis of novel sheet-like Janus structures via a triblock terpolymer template.
- Investigation of the solution properties.
- Study of the interfacial properties and the stabilizing efficiency for emulsions.

Synthetic Strategy

Templated synthesis of Janus structures via microphase separated terblock copolymers

- Crosslinking of the inner polystyrene layer of the bulk morphology of the SBT terpolymers and subsequent sonication until a semiturbid solution is reached.
- Acidic hydrolysis of the tert-butyl groups and step-wise dialysis from dioxane into water.

Bayreuther Zentrum für Kolloide und Grenzflächen, Universität Bayreuth, D-95440 Bayreuth, Germany

- Highly surface-active novel class of materials.