

Catalysts for green chemistry

- Tailored multifunctional catalysts
 - Combination of diverse catalysts within one particle
 - Combination of inductively heatable building blocks with catalysts within one particle
- Upscaling of catalyst syntheses

Connection to the 12 principles of green chemistry

- Design for energy efficiency
- Use of renewable feedstocks
- Catalysis
- Less hazardous chemical syntheses
- Reduce derivatives
- Prevention of waste

Contact

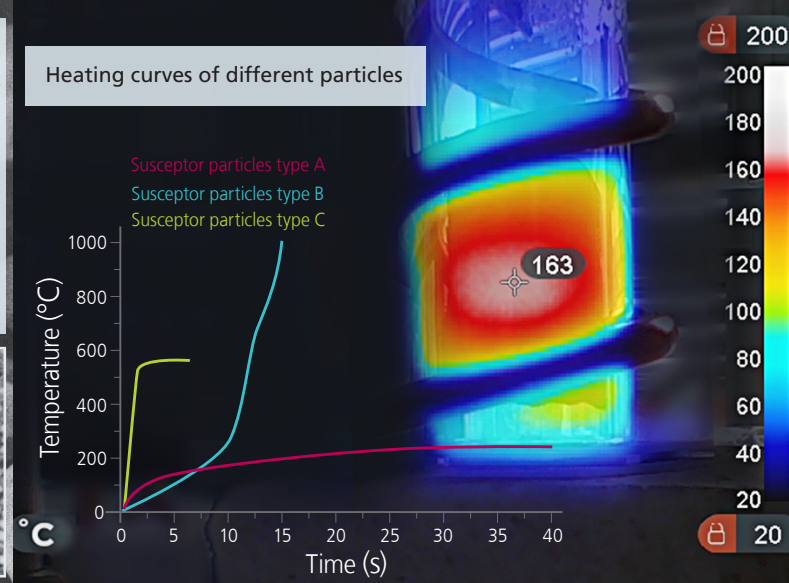
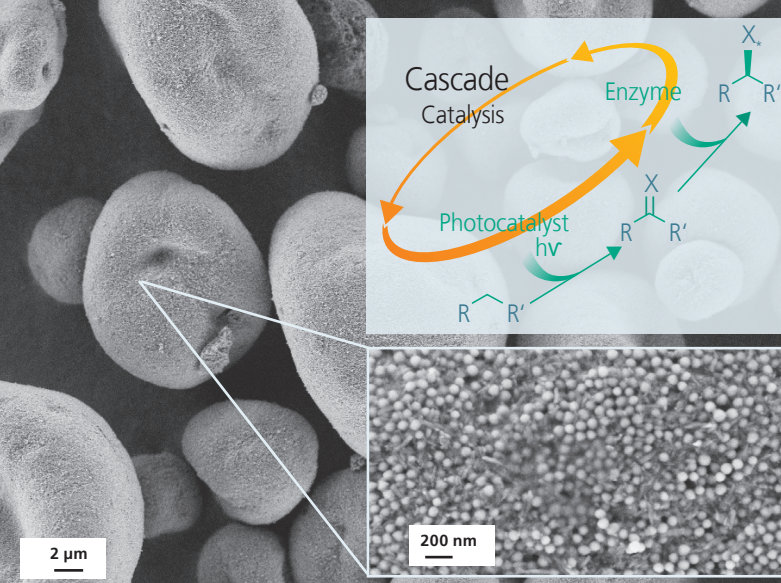
Dr. Susanne Wintzheimer
Scientific Head Particle Technology
susanne.wintzheimer@isc.fraunhofer.de

Dr. Bettina Herbig
Project Manager Particle Technology
bettina.herbig@isc.fraunhofer.de

Fraunhofer Institute for Silicate Research ISC
Neunerplatz 2
97082 Würzburg | Germany

© Fraunhofer ISC





Particle-based catalysis

Combination of various catalytic building blocks within a single particle

- Metal catalysis
- Photocatalysis
- Biocatalysis
- Organocatalysis

Potential benefits

- Heterogeneous catalysis allows more easily catalyst separation and thus higher product purity
- Applicable in batch and flow reactors
- Catalytic cascade reactions, e.g., photocatalytic H_2O_2 generation for a following enzymatic step using peroxxygenases

Intrinsic susceptor particles for ultraprecise reaction control

- Susceptor particles combinable with various surfaces or with catalyst particles
- Precise heat control (Curie temperature, control of field strength and frequency)
- Contactless heating

Potential benefits

- Easy electrification of a catalytic process
- Direct heating reduces energy losses
- Fast control / high heating ramps
- Targeted local heating of catalyst particles
- Higher conversion rates, higher product purity

Upscaling of wet-chemical particle syntheses

- Batch reaction
- Continuous flow
- Hydrothermal syntheses
- Precipitation reaction
- Sol-gel reaction

Potential benefits

- Closing the gap between university and industry
- Particle syntheses in 100L-batch reactor or continuous flow
- Reduced commercialization risks due to reduced upscaling factor