ECOTOXICOLOGICAL RELEVANCE OF IRON-BASED NANOMATERIALS

Tobias Meißner, Annegret Potthoff
Fraunhofer Institute for Ceramic Technologies and Systems IKTS

MOTIVATION
Within the German project Fe-NANOSIT a novel nano-structured composite material made of zero-valent iron and activated carbon (Carbo-Iron) is developed. For a deliberate insertion of Carbo-Iron in the environment a risk assessment, including ecotoxicological studies, is necessary.

AIMS
- Development of stable Carbo-Iron suspensions
- Elucidation of interactions between nanoparticles and dispersants
- Assessment of the particle’s behavior in ecotoxicological media
- Correlation characterization ↔ ecotoxicological experiments

PROCEDURE AND METHODS

RESULTS
- Use of carboxymethyl cellulose (CMC) as dispersant to stabilize Carbo-Iron suspensions
- Dispersing, e.g. by ultrasound, to get suspensions with isolated particles
  → Preparation of suspensions, which are clearly defined in terms of particle size and distribution
  → Prerequisite for meaningful ecotoxicological investigations
- Zeta potential measurements to assess electrostatic stabilization
  → Increasing CMC concentration induces decreasing zeta potential values
  → Improved electrostatic repulsion forces between particles enhance suspension stability

CONCLUSION
- Electrosteric and sedimentation stability of Carbo-Iron particles in suspension and dissolution of iron depend on the concentration of the dispersant carboxymethyl cellulose (CMC).
- For interpretation of ecotoxicological test results a complex characterisation of particles in media is necessary.

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