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Nanoparticle Synthesis in Ionic Liquids

A.-V. Mudring, T. Alammar, T. Bäcker and K. Richter

Anorganische Chemie I – Festkörperchemie und Materialien, Ruhr-Universität Bochum, D-44780 Bochum, Germany

Ionic liquids (ILs) are able to offer outstanding properties as media for the synthesis of nanoparticles. The low surface tension of many ILs leads to high nucleation rates and, in consequence, to small particles. The IL itself can act as an electronic as well as a steric stabilizer and depress particle growth. As highly structured liquids, ILs have a strong effect on the morphology of the particles formed.

Three synthesis techniques make special use of the unique properties that ILs offer when compared to conventionals VOCs (volatile organic solvents): First, direct microwave synthesis because of the ionic character and high polarizability of the synthesis medium. Secondly, physical vapour deposition (PVD) under high vacuum becomes possible due to the low vapour pressure of some ILs. In order to make full use of the possibilities that ILs offer we have designed a set of reducing ILs which can be used as direct reaction partners for the generation of metal nanoparticles. Third, sonochemistry has proven an especially powerful route towards oxidic nanomaterials.

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