Chemical Vapor Synthesis of Size-Selected Zinc Oxide Nanoparticles

*Sebastian Polarz, Abhijit Roy, Michael Merz, Simon Halm, Detlef Schröder, Lars Schneider, Gerd Bacher, Frank E. Kruis, and Matthias Driess**

***Z**nO can be regarded as one of the most important metal oxide semiconductors for future applications. Similar to silicon in microelectronics, it is not only important to obtain nanoscale building blocks of ZnO, but also extraordinary purity has to be ensured. A new gas-phase approach to obtain size-selected, nanocrystalline ZnO particles is presented. The tetrameric alkyl-alkoxy zinc compound $[CH_3ZnOCH(CH_3)_2]_4$ is chemically transformed into ZnO, and the mechanism of gas-phase transformation is studied in detail. Furthermore, the morphological genesis of particles via gas-phase sintering is investigated, and for the first time a detailed model of the gas-phase sintering processes of ZnO is presented. Various analytical techniques (powder XRD, TEM/energy-dispersive X-ray spectroscopy, magic-angle spinning NMR spectroscopy, FTIR spectroscopy, etc.) are used to investigate the structure and purity of the samples. In particular, the defect structure of the ZnO was studied by photoluminescence spectroscopy.*

Keywords:
- gas-phase reactions
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- single-source precursors
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