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SYNTHESIS OF METALLIC AND OXIDE NANO-POWDER BY ULTRASONIC SPRAY PYROLYSIS

S. Stopić, B. Friedrich
RWTH Aachen University, IME Process Metallurgy and Metal Recycling, Aachen, Germany

Nanotechnology can be defined as engineering of functional materials at molecular scale. Ultrasonic spray pyrolysis (USP) is an innovative powerful tool for synthesis of particles made from various materials with controlled and uniform size. USP enables very efficient to control powder morphology and allows the application of relatively cheap precursors. Non-agglomerated nanosized particles of metals (Fe, Cu, Co, Ni, Ag, Au, CoFe, NiFe) as well as oxides (ZnO, WO_3, RuO_2/TiO_2) were synthesized by using appropriate solutions and hydrogen or nitrogen atmosphere at RWTH Aachen University in last five years. Well controlled particle sizes have been obtained by adjusting the concentrations of precursor solutions and the conditions of the aerosol thermal decomposition/thermolysis. The temperature range was defined via thermochemical analysis using FactSage® Software. A Scanning Mobility Particle Sizer (SMPS) was applied for on-line measurement of the size distribution in the range from 5 nm to 1000 nm. Dry nanoparticles are deposited using an electrostatic precipitator. The collection efficiencies of nanoparticles will be discussed together with the resulted morphologies for different chemical systems with strong relation to their applications aimed for in medicine, batteries and catalysis.