MORPHOLOGY- AND SIZE-CONTROLLED SYNTHESIS OF NANOPARTICLES DRIVEN UNDER MICROWAVE IRRADIATION

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Nan-sized inorganic particles having characteristic morphology and narrow size-distribution have attracted attention due to their potential applications as functional materials, *i.e.*, catalysts, magnetic materials, conducting inks, and ferrofluids. Various preparation and stabilization methods of nano-sized metal particles, metal oxide particles, and metal sulfide particles have been reported. On the other hand, microwave heating has recently begun to be recognized among chemists as a new method for flash synthesis of organic and inorganic compounds.

Flash heating of chemical compounds under microwave (MW) irradiation can be explained as due to dielectric loss for polar liquid chemicals, conduction loss for inorganic chemicals, and interfacial polarization loss of organic chemicals on inorganic solid micron-size powder. Such MW heating leads to minute-order chemical reactions similar to photo-induced chemical reactions. We have been focusing that this MW heating mode should be favorable for uniform nucleation of nano-materials and their homogeneous instantaneous particle growth, giving nano-materials with much smaller particle size and narrow size-distribution. In fact, we have been developing microwave-driven synthesis of nanoparticles of inorganic compounds in solution systems on the basis of not only the above ideas but also a new target of controlling morphology of nanoparticles.

We will demonstrate several examples including metal, metal oxide, and metal sulfide and discuss on advantages of catalytic microwave heating for synthesis of inorganic nano-materials compared to conventional heating.

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