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Template-Free hydrothermal synthesis of mesoporous MgO nanostructures and their application in water treatment

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The unique size and shape-dependent properties of nanomaterials have simulated many investigators to develop more simple and inexpensive routes to fabricate morphology controllable nanomaterials. Herein, we demonstrate an environmentally benign route to synthesize the $Mg(OH)_2$ nanostructures with morphologies of nanowires and microflowers composed of nanoplates based on the simple hydrolysis reaction of $Mg(CH_3COO)_2$, without using any additives, surfactants and substrates. It is found that the reaction medium has played a crucial role in the morphological tailoring of the nanostructures of the precursor. The high polarity of water molecules favors the polar growth of the precursor, resulting in the formation of nanowires with a diameter of 80 nm, whereas a mixed water-ethanol medium with lower degree of polarity leads to the formation of microflowers. Moreover, the $Mg(OH)_2$ (brucite) could be transformed to MgO (periclase) by heat treatment via a topotactic transformation. After thermal treatment, the wire-like and flower-like morphologies could be maintained, except the formation of porosity, which is due to thermal decomposition of $Mg(OH)_2$ and releasing of H_2O. Both the mesoporous MgO nanowires and microflowers show superior ability of adsorbing organic dye in the polluted water treatment.

Biography

Jiabiao Lian has obtained his master degree from Nankai University in 2010. He is pursuing his Ph.D. in Materials Science and Engineering at the Chinese University of Hong Kong as a recipient of the Hong Kong PhD Fellowship. His research interests focus on the morphology controllable synthesis and characterization of oxides functional nanomaterials as well as their related applications. He has spoken at the 2011 North American Solid State Chemistry Conference at McMaster University (Canada) and has published more than 5 papers in some reputed journals, such as ACS Nano and Chemical Communications.

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