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Sonochemical Synthesis and Characterization of Lead Iodide Hydroxide Micro/nanostructures

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Abstract

For the first time, micro-/nano-sized lead iodide hydroxide; Pb(OH)I, has been successfully prepared via a simple ultrasonic method. In this method, lead nitrate and lithium iodide were applied as starting reagents to fabricate Pb(OH)I micro/nanostructures at different conditions. The effect of different surfactants like *N*,*N*-bis(salicylidene)-ethylenediamine (H_2salen), sodium dodecyl sulfate (SDS) and polyvinylpyrrolidone (PVP), sonication time, and ultrasonic intensity on the morphology and particle size of the products has been investigated. The as-produced micro/nanostructures were characterized with the aid of XRD, SEM, TEM, UV-vis, EDS and FT-IR. According to the SEM images, different morphologies of Pb(OH)I including micro- and nano-sized rods were formed by changing the preparation conditions. Based on the XRD results, it was found that Pb(OH)I and PbI_2 have been produced with and without sonication at the same conditions, respectively. The use of the H_2salen and sonication treatment were confirmed to be the crucial factors determining the formation of one-dimensional Pb(OH)I micro/nanostructures.