Sonochemical Synthesis of Nanosized $LiCoO_2$ for Lithium Rechargeable Batteries

Kwang-Heon Kim and Kwang-Bum Kim
Department of Metallurgical Engineering, Yonsei University, 134 Sinchon-dong Seodamun-gu, Seoul, Korea

Sonochemistry, the use of power ultrasound to stimulate chemical process in liquid, is currently the focus in a wide range of chemical materials science and technology. The chemical effects of ultrasound arise from acoustic cavitation (the formation, growth, and implosive collapse of bubbles in a liquid). During cavitational collapse, intense heating of the bubbles occurs. These hot spots have temperatures of roughly 5000 K, pressures of about 1000 atmospheres, and cooling rates above 10^{10} K/s. These extreme conditions attained during bubble collapse have been exploited to prepare nanoparticles of metals, alloys, metal carbides, metal oxides, and metal sulfides.

Sonochemical synthesis is a environmentally friendly, energy efficient and low temperature route to prepare nanosized materials in liquid. Nanosized materials are expected to have properties different from those of bulk materials in view of crystalline structure, local structure, electronic structure, surface properties and phase transformation. Properties typical to nanosized metal oxides will be considerd to enhance their electrochemical properties required for electrochemical power sources.

In this study, we has been tried to prepare nanosized LiCoO2 particles using sonochemical synthesis. The morphological, thermal, and electrochemical properties of nanosized LiCoO2 particles were investigated by XRD, Raman, TEM, SEM, TGA, DSC, and electrochemical methods.

More detailed discussion of the data will be made in the conference.