

### Supercritical Hydrothermal Synthesis of Organic-Modified Zinc Oxide Nanoparticles using Supercritical Fluids

이지예, 홍승아<sup>1</sup>, 이재동, 김재훈<sup>1,\*</sup>  
경원대학교; <sup>1</sup>한국과학기술연구원  
(jaehoonkim@kist.re.kr\*)

Zinc oxide (ZnO) has been proposed for use in a potentially anode material of lithium secondary battery applications. Supercritical hydrothermal synthesis (SHS) has been developed for nanosize particle or metal oxides. In this work, one-pot synthesis of organic modified zinc oxide (ZnO) nanoparticles in supercritical methanol and water was studied using oleic acid ( $\text{CH}_3(\text{CH}_2)_7\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$ ) as an organic modifier. The use of supercritical methanol and the addition of organic modifier into the reaction system has a significant effect on the particle size and morphology. Wide angle X-ray diffraction (WAXD) analysis revealed that the surface-modified nanoparticles retained ZnO crystalline structure. Fourier transform infrared (FT-IR) spectroscopy indicated the existence of an organic layer on the surface of nanoparticles. The results of scanning electron microscopy (SEM) and transmission electron microscopy (TEM) images showed that the organic modification affected crystal growth. The particle size was measured by Brunauer, Emmet, and Teller (BET) analysis, and shown the electrochemical performance.