Synthesis of the lithium titanate($Li_4Ti_5O_{12}$) particles in supercritical methanol

이영호[1,2], 안기호[1,2], 송봉근[1,2], 이윤우[1,2,*]
[1]서울대학교 공과대학 화학생물공학부;
[2]서울대학교 화학공정신기술연구소
(ywlee@snu.ac.kr*)

Spinel lithium titanate ($Li_4Ti_5O_{12}$) is widely used as an anode material in the lithium-ion batteries due to its small volume change during the intercalation/deintercalation of lithium ions and its long life-cycle. In conventional method, $Li_4Ti_5O_{12}$ particles have been prepared by the solid-state reaction, which requires the high reaction temperature (700 ~ 1000 ℃) and long reaction time (10 ~ 24 hrs).

In this study, $Li_4Ti_5O_{12}$ was prepared in the supercritical methanol and supercritical water. Li-Ti-O precursors were prepared by mixing the lithium hydroxide aqueous solution and 2-propanol containing titanium isopropoxide, and Li-Ti-O precursors were redispersed in water or methanol. The reaction was performed at 400 ℃ and 300 bar. The molar ratio of lithium hydroxide and titanium isopropoxide was varied from 4 : 5 to 2 : 1. In addition, the effect of reaction medium on the crystalline structure of the product was also investigated.