Mechano-thermally Activated Solid-state Synthesis of $Li_4Ti_5O_{12}$ Spinel from Li_2CO_3-TiO_2 Mixtures

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Simultaneous TG/DSC measurements performed on mixtures $2Li_2CO_3$-$5TiO_2$ (anatase) subjected to high-energy milling showed that both the temperature and the enthalpy of Li_2CO_3 decomposition are much lower than in the case of TG/DSC runs performed on a sample of a physical mixture. On the basis of the thermoanalytical evidence a solid-state synthesis of the spinel compound $Li_4Ti_5O_{12}$ has been proposed that combines mechanical (by high-energy milling) and thermal activation (8 h annealing at 973 K): the obtained compound shows a lattice constant in very good agreement with that expected for the pure phase $Li_{1+x}Ti_{2-x}O_4$ ($x = 0.333$). The molar heat capacity of $Li_4Ti_5O_{12}$ has been determined in the temperature range 323 – 633 K by quasi-isothermal Modulated Differential Scanning Calorimetry (MDSC). The specific surface area of $Li_4Ti_5O_{12}$ has been determined by gas adsorption.

Key words: $Li_4Ti_5O_{12}$, Solid-state Synthesis, High-energy Milling, Molar Heat Capacity