Nanoparticles of LiFePO₄ during ultrasonic spray pyrolysis (USP)

Albrecht Schwinger, Srecko R. Stopic, Bernd K. Friedrich
IME Process Metallurgy and Metal Recycling, Inzestrasse 3, Aachen, Germany

Nanosized LiFePO₄ is a promising approach for a new cathode material. The key benefits for an application of nanosized LiFePO₄ are the low costs, the thermal stability and it is non-toxic. Now there is a demand for a manufacturing process which produces electrochemically active LiFePO₄ at a low cost. The existence of two oxidation degrees of iron in nature (Fe²⁺ and Fe³⁺) is the major difficulty related to the synthesis of these nanoparticles. To adjust an inert atmosphere we used nitrogen. The reaction temperature in the furnace was 800°C. Previous thermodynamic analysis was performed using FactSage software in order to predict an existence of different compounds at 800°C. A new precursor system was tested in order to investigate a new proposed mechanism for synthesis. The influence of different reaction parameters on particle size was investigated. SEM, EDS, TEM methods were used for the analysis of morphology of prepared nanoparticles. Figure 1 shows TEM-analysis of the nanosized LiFePO₄ particles via USP method.

Fig. 1: SEM analysis of nanosized LiFePO₄ prepared by USP method