

Poster Presentation

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TEM observation for low-temperature grown spinel-type LiMn₂O₄ crystals

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Present spinel-type lithium manganese oxides have attracted much attention as positive-electrode active materials for lithium-ion rechargeable batteries, which are the most sought-after power source for various electric applications, because of their low cost, non-toxicity, and high abundance of source materials compared to the conventionally used LiCoO₂ crystals. Spinel-type LiMn₂O₄ crystals were grown at low-temperature by using a LiCl-KCl flux. The chemical compositions, sizes, and shapes of the LiMn₂O₄ crystals could be tuned by simply changing the growth conditions. Among the various products, the crystals grown at a low temperature of 873 K showed a small average size of 200 nm. Electron diffraction patterns and TEM images reveal the truncated octahedral shape of the crystals. The flux growth driven by rapid cooling resulted in truncated octahedral LiMn₂O₄ crystals surrounded by both dominating {111} and minor {100} faces with {311} and {220} edges. Lattice images indicate that crystals grown at a lower temperature have the excellent crystallinity. The small LiMn₂O₄ crystals grown at 873 K showed better rate properties than the large crystals grown at 1173 K, when used as a positive active material in lithium-ion rechargeable batteries.

[1] Mizuno, Y. et al., (2014). *CrystEngComm*, 16, 1157-1162

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