Synthesis and Electrochemical Properties of LiMnBO₃
Anping Tang, Jie Shen, Donghua He
School of Chemistry and chemical Engineering, Hunan University of Science and Technology,
Hunan University of Science and Technology, Xiangtan 411201, China

LiMBO₃ (M = Fe, Mn, etc.) materials have recently attracted researchers due to large theoretical capacity (~220 mAh/g) [1, 2]. Even though the borates are promising for high energy density, only a few works were reported on the electrochemical properties. In this context, we have made an attempt to explore the possibility of synthesizing LiMnBO₃ via polymeric precursor method.

Experimental
The proper amount of citric acid was first dissolved in water and the required amount of manganese carbonate was then added to this solution. After complete dissolution, the required amount of H₃BO₃ and LiNO₃ was added to the solution to form a stoichiometric composition. Finally, D-sorbitol was added to the solution to promote the mixed citrate polymerization by a polyesterification reaction. After water was removed, the gel was first heat treated at 330 °C for 5 h, and then treated in an Ar atmosphere at 700 °C for 10 h.

Results and discussion
Powder X-ray diffraction patterns of the LiMnBO₃ were presented in Figure 1. All of the diffraction peaks can be matched to the theoretical patterns (ICSD 200535), in good agreement with the earlier report of Legagneur et al. [2].

LiMnBO₃ delivered an initial discharge capacity of 112 mAh/g against the charge capacity of 140. The loss in capacity might be due to the formation of a solid electrolyte interface on the electrodes. After 20 cycles, discharge capacities 30 mAh/g was maintained for LiMnBO₃.

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References

Figure 1. X-ray diffraction patterns of LiMnBO₃

Figure 2. charge/discharge curves of Li/ LiMnBO₃ cell and discharge capacity with number of cycles with a rate of C/20 at room temperature