Synthesis of Porous Bowl-like LiFePO₄/C Composite with Ultrahigh Rate Capability

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Well-crystallized olivine-structure LiFePO₄/C composite was synthesized by a wet milling-assisted spray drying using cheap Fe₃O₄ as iron source. The composite exhibited bowl-like secondary particles that are mainly constructed of numerous carbon coated nanoparticles. Such a composite possesses a porous structure with an average pore size of 8.14 nm and a high BET surface area of 50.57 m² g⁻¹. Electrochemical tests revealed that the cathode material exhibited a high rate capability (84 mA h g⁻¹ at 90 C) and good cycle stability (93% capacity retention over 500 cycles at 10 C). That is because the uniform carbon coating increased the electronic conductivity, while, large specific surface area, porous structure, and nano-sized particles greatly favored the electrolyte accessibility and rapid Li⁺ transport.

Keywords: lithium ion battery; cathode material; LiFePO₄/C composite; rate performance

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