Tetrabasic Lead Sulphate Micro-Rods as Positive Active Material for Lead Acid Battery

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It is well known that positive electrodes with high content of tetrabasic lead sulphate ($4\text{PbO} \cdot \text{PbSO}_4$, short as 4BS) can improve the cycle performance of lead acid batteries (LABs). To achieve this, the positive plates are usually fabricated with addition of 4BS micro-crystals and long-time curing at high temperature, which is very costly. Herein, we report a fast and feasible route to produce 4BS, which are micro-rods of about 10 μm in length and 1 μm in diameter. In this article, we show a comparison of the electrochemical performances of the original as-prepared 4BS and pulverised 4BS crystals (dimensions of 0.5 to 2 μm) in positive electrodes. The original 4BS shows much better performances than the pulverised. The original discharges a capacity of more than 100 mAh g^{-1} even after 1000 cycles of 100% DOD (depth of discharge) at 100 mA g^{-1} in a flooded cell. Moreover, addition of 10% Pb_3O_4 , 0.5% Sb_2O_3 and 0.5% SnSO_4 to the original 4BS increases the discharge capacity to 121.0 mAh g^{-1} . Therefore, we conclude that 4BS micro-rods can be directly used as the positive active material, which simplifies and unifies the production of LABs.

Keywords: Lead acid battery; tetrabasic lead sulphate; positive active material; cycle life; additive

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