Petal-shaped Copper(I) bromide Modified Copper/Graphite as Current Collector for Lithium ion Batteries

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A novel finding, that petal-shaped cuprous bromide (CuBr) particles with a diameter of about 1.5 μm can be prepared onto the commercial copper (Cu) foil surface (denoted as CuBr/Cu) via a soaking method, was reported for the first time in this work. The soaking solution used for producing CuBr only contained 0.5 M CuSO_4 and a proper amount of HTAB (hexadecyl trimethyl ammonium bromide). And the CuBr coated Cu foils, prepared in the presence of 2 mM, 5mM and 10 mM HTAB were respectively nominated as foil a, b and c. The morphologies and the chemical components of all prepared particles were investigated by using SEM and XRD, respectively, indicating that all prepared particles delivered a petal-shaped morphology and the main chemical substance of all as-prepared particles was CuBr. When being used as the current collectors, all newly prepared foils exhibited an evident promoting effect upon the electrochemical performance of the graphite electrode. For instance, the initial discharge capacity (DC) value of the graphite electrode prepared using foil b (electrode b) at 0.1A g^{-1} was measured to be 520 mAh g^{-1} , being about 1.49 times higher than that of the graphite electrode assembled using the conventional Cu foil (electrode o) (350 mAh g^{-1}). More importantly, even after 100 cycles, the DC value (141 mAh g^{-1}) of electrode b at 1A g^{-1} was about 3.9 time larger than that of electrode o (36 mAh g^{-1}). Presenting a novel method to prepare petal-shaped micron-sized CuBr particles as well as showing a practicable way to improve the electrochemical properties of the graphite electrode were the main dedications of this preliminary work, which was very meaningful to the electrochemical performance improvement of the graphite electrode based lithium ion batteries (LIBs) since no extra energy consumption and no additional preparing processes were required in achieving above works.

Keywords: cuprous bromide; surface active agent; immersion process; commercial graphite electrode; lithium ion batteries.

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