

Next-generation energy system: low-cost aluminum-ion batteries and solar-rechargeable batteries

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Abstract: Rechargeable Aluminum-ion batteries (AIBs) are considered as a new generation of large-scale energy storage device due to their attractive features of abundant aluminum source, high specific capacity and energy density.^[1] However, the AIBs suffer from the lack of suitable cathode materials with desirable capacity and long-term stability, which severely restrict the practical application of AIBs. Herein, we report a binder-free and self-standing cobalt sulfide encapsulated in carbon nanotubes as a novel cathode material for AIBs.^[2] The binder-free and self-standing electrode effectively eliminate the side-reactions and material disintegrations in AIBs. In the meanwhile, the electrode exhibits not only high discharge capacity (315 mA h g^{-1} at 100 mA g^{-1}), enhanced rate ability (154 mA h g^{-1} at 1 A g^{-1}) but also extraordinary cycling ability (maintain 87 mA h g^{-1} after 6000 cycles at 1 A g^{-1}). The new findings reported here highlights the possibility for designing high performance cathode materials for scalable and flexible AIBs.^[3]

References

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