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Nanostructured Molybdenum Oxides for Lithium-Ion Batteries
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Lithium-ion batteries are the current power sources of choice for portable electronics. Although such batteries are commercially successful, they are not keeping pace with the rapid advances in computing technologies. Also, further improvement of performance and simultaneous reduction in cost as well as material toxicity remain the subject of intensive research. Here we report the synthesis and electrochemical performance of a novel molybdenum oxide nanoparticle anode that dramatically improves current Li-ion battery technologies. Crystalline MoO_x nanoparticles have been grown by an economical hot-wire chemical-vapor-deposition (HWCVD) technique and a recently developed electrophoresis technique is employed for the fabrication of porous nanoparticle anodes. Our material exhibits a high reversible capacity of ∼600 mAh/g in the range 0.005-3.0 V with excellent cycling characteristics as well as high-rate capability. Both cycling stability and rate capability issues are addressed by employing these porous molybdenum oxide films that consist of nanoscale active particles. These materials will impact the next generations of rechargeable lithium batteries, not only for applications in consumer electronics, but also for clean energy storage and use in hybrid electric vehicles.

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