CNT-based Electrode Architectures for Enhanced Lithium Ion Battery Performance

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Increasing prevalence of portable electronic devices led to a growing demand for more efficient energy storage options. Lithium ion chemistry has grown to dominate the battery market, but it still requires significant improvements to meet the increasing need for smaller, cheaper and better performing batteries. The use of nanomaterials has garnered much attention in recent years as a potential way of improving battery performance while decreasing the size. However, new problems are introduced with these materials such as low packing density and high reactivity with the electrolyte. This paper focuses on the development of an electrode architecture using nanomaterials to increase power density and decrease lithium ion transport distance while enhancing electrical conductivity within the cell. The proposed architecture consists of a stacked, 2D structure composed of intercinnected layers of carbon nanotubes and active material particles that can be applied to both the anode and the cathode. The process shows great promise where it can be 25 times better than standard batteries at high rates (such as 5C).