

Co₃O₄ decorated 3-D microporous carbon foam for binder-free lithium-ion battery anode

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Recently, the binder-free metal oxide electrode is prepared through the deposition or growing of the metal oxides on the Ni-foam substrates. The direct contact between the active material and current collector in the 3-dimensional Ni-foam facilitates the sufficient electronic and ionic transfer kinetics. In another approach, the TiO₂ or CuO based binder-free electrode is obtained by the etching of their respective metal foils (Ti or Cu). The metal foils acts as a continuous and fast conduction pathway to electrons, and subsequently reduces the electrical resistance of the electrode. However, the high cost and undesirable oxidation reactions of the metal substrates are main drawbacks, which seriously limit the application into a large scale. Herein, we prepared the binder-free Co₃O₄ electrode through the growing of Co₃O₄ directly on the freestanding agarose derived carbon-foam electrode. The high surface area of the freestanding carbon foam not only acting as a substrate for Co₃O₄, but also provide the electronic and ionic diffusion pathways. Due to the presence of high porosity, and electrical conductivity in the Co₃O₄/carbon foam composites, it is believed to give excellent performances in Li-ion battery anode.