

One-Pot Synthesis of Nb₂O₅@Niobium Carbide MXene Hierarchical Composite for Energy Storage Devices

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Metal oxide/carbon composites have been widely used as energy storage materials, as metal oxides have high capacity and the carbon acts as a conducting matrix for electron transfer. Out of these materials, niobium oxide (Nb₂O₅)/carbon composites have been preferred due to its high capacity, good cyclability, and stable operation. Herein, we have oxidized a two-dimensional metal carbide (MXene) in CO₂ flow gas to fabricate Nb₂O₅/carbon@Niobium Carbide MXene via one step oxidation. Such a core-shell configuration would explore the high conductivity of core MXene, the fast rate response of shell Nb₂O₅ and electron “bridge” effect of disordered carbon. The Nb₂O₅/carbon@Nb₄C₃T_x showed 208 mAh g⁻¹ and 141 mAh cm⁻³ at 50 mA g⁻¹ (0.25 C), and retained 94% of initial specific capacity after 400 cycles with good rate capability. Since oxidized MXene as a Li-ion battery anode has just started to be investigated, there is great room to push the boundaries further and achieve better performances.