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Rapidly microwave-synthesized SnO_2 nanorods anchored on onion-like carbons (OLCs) as anode material for lithium-ion batteries

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ABSTRACT:

Nanostructured SnO_2/onion-like carbon (OLC) composites were fabricated via a facile and rapid microwave-assisted synthesis technique. The influence of SnO_2 nanorods anchored on OLC was investigated as an anode material for the first time in lithium-ion battery applications. The OLC successfully served as a barrier layer between SnO_2 nanorods and electrolyte to avoid the rupturing of the unstable SEI layer in order to provide improved coulombic efficiency, ionic resistance, and electronic conductivity. The SnO_2 nanorod-OLC nanocomposite exhibits much stable and better electrochemical performance than pure SnO_2 nanorods. The SnO_2-OLC composite exhibited a remarkably high specific capacity of 884 mAh g^{-1} after 100 cycles with long-term cycling stability and excellent capacity retention of 93.5% (at current density of 100 mA g^{-1}) with only 0.23% fading per cycle. The outstanding performance is attributed to the high surface area of OLC which can enhance electron transportation and high lithium-ion diffusion during cycling.