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Metal-organic frameworks derived flower-like Co₃O₄/nitrogen doped graphite carbon hybrid for high-performance sodium-ion batteries

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Abstract In this work, a novel flower-like cobalt-based metal organic frameworks (MOFs) self-assembled by Co²⁺ and nicotinic acid have been designed and synthesized. After a simple annealing treatment, Co₃O₄ nanoparticles in-situ decorating on nitrogen doped graphite carbon-sheet (Co₃O₄/NC) were obtained. The resultant Co₃O₄/NC hybrid with unique flower-like structure and ration combination of Co₃O₄ nanoparticles and nitrogen doped graphite carbon, endowing the hybrid with enhanced electrical conductivity, short ion diffusion pathways and rich porosity to the materials, which can largely alleviate the problems of Co₃O₄ such as inferior intrinsic electrical conductivity, sluggish ion kinetics and large volume change upon cycling. When evaluated as anode material for sodium-ion batteries (SIBs), the Co₃O₄/NC hybrid exhibits satisfied reversible capacity (213.9 mAh g⁻¹ after 100 cycles at 0.1 A g⁻¹), excellent rate capability (145.4 mAh g⁻¹ at 2 A g⁻¹ and 130.1 mAh g⁻¹ at 4 A g⁻¹)

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