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Metal-organic frameworks derived flower-like Co_3O_4/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 Co^{2+} and nicotinic acid have been designed and synthesized. After a simple annealing treatment, Co_3O_4 nanoparticles in-situ decorating on nitrogen doped graphite carbon-sheet (Co_3O_4/NC) were obtained. The resultant Co_3O_4/NC hybrid with unique flower-like structure and ration combination of Co_3O_4 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 Co_3O_4 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 Co_3O_4/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})