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Hollow urchin-like NiO/NiCo₂O₄ heterostructures as highly efficient catalysts for selective oxidation of styrene

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Abstract: Three-dimensional (3D) hierarchical hollow urchin-like NiO/NiCo₂O₄ heterostructures have been prepared via a facile one-pot hydrothermal method. The 3D urchin-like structure brings about high specific surface area of 40.2 m²g⁻¹. The NiO/NiCo₂O₄ heterostructures are composed of 59 wt% of NiO and 41 wt% of NiCo₂O₄ and enriched with NiO-NiCo₂O₄ phase boundaries. When used as catalysts for styrene oxidation reaction (SOR), the NiO/NiCo₂O₄ heterostructures present a markedly high selectivity of 90.8% to styrene oxide (SO) and a high SO yield of 81.4%. The high catalytic performance of the NiO/NiCo₂O₄ heterostructures can be attributed to the high specific surface area and the abundant NiO-NiCo₂O₄ phase boundaries, both of which contribute to the numerous active sites.

Key words: hierarchical; hollow; NiO; NiCo₂O₄; styrene oxidation

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