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Porous Nanosheet Network Architecture of CoP@Ni(OH)$_2$ Composites for High Performance Supercapacitors

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Abstract

A CoP@Ni(OH)$_2$ composite with porous nanosheet networks was directly synthesized on carbon cloth, which avoids the usage of any binders and additives. Benefiting from the CoP nanosheet core that could provide fast electron transport pathway and distinctive nano-architecture, this composite achieved a specific capacitance of 1989 F g^{-1} at a current density of 2.0 A g^{-1}, good rate capability and cyclic stability. Furthermore, an aqueous asymmetrical CoP@Ni(OH)$_2$//AC supercapacitor (ASC) was also successfully assembled. The ASC device exhibited good electrochemical properties including a 1.8 V potential window, a high specific capacitance of 220 F g^{-1} at a current density of 1 A g^{-1} and long-term cycling performance. In the meantime, the ASC device also achieved a high energy density of 89.6 Wh kg^{-1} at a power density of 0.91 KW kg^{-1}. These results suggest that nano-architectured CoP@Ni(OH)$_2$ composite has great potential for application in energy storage device.

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