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**Sodium Vanadate Nanowires @ Polypyrrole with Synergetic Core-Shell  
Structure for Enhanced Reversible Sodium-Ion Storage**

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**Abstract:** Use of hybridized transition-metal oxides nanostructures with a shell coating show promise for improving the electrochemical performance of sodium-ion batteries. Herein, a novel type of designed sodium vanadate @ polypyrrole ( $\text{Na}_5\text{V}_{12}\text{O}_{32}@PPy$ ) nanocomposites with a synergetic core-shell structure was fabricated using sequential hydrothermal and electrodeposition methods. When the  $\text{Na}_5\text{V}_{12}\text{O}_{32}@PPy$  nanocomposites were employed as a cathode, the assembled sodium-ion batteries exhibited a high reversible discharge capacity of  $213 \text{ mAh g}^{-1}$  at a current density of  $30 \text{ mA g}^{-1}$ , high rate performance ( $133 \text{ mAh g}^{-1}$  at  $480 \text{ mA g}^{-1}$ ) and superior cycling performance ( $202 \text{ mAh g}^{-1}$  at  $100 \text{ mA g}^{-1}$  after 100 cycles with a capacity retention of 94%). By contrast, the cycling behavior of this novel material

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