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The Shape Effect of Manganese(II,III) Oxide Nanoparticles on the Performance of Electrochemical Capacitors

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Abstract: Manganese(II,III) oxide (Mn_3O_4) with various shapes including square prisms, polyhedra and tetragonal bipyramids are selectively synthesized with the mediation of fatty acids at nanoscale (<20 nm). Among all nanostructures, Mn_3O_4 tetragonal bipyramids show the largest gravimetric capacitance of 304 F g^{-1} with excellent rate capability and long-term cycling stability. In contrast, Mn_3O_4 polyhedra show relatively large intercalation capacity and poor stability, which could be related to the abundant low-coordination sites (edges, corners and defects) exposed on the surface. Transmission electron microscopy analysis reveals that the capacitance loss is