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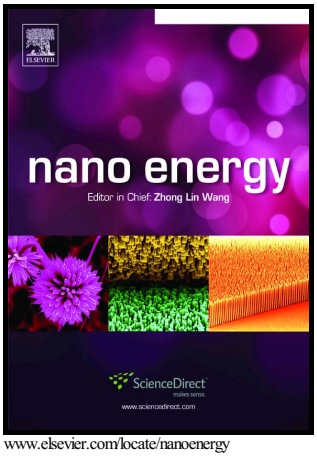

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Boosted Crystalline/Amorphous $Fe_2O_{3-\delta}$ Core/Shell Heterostructure for Flexible Solid-State Pseudocapacitors in Large Scale

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Abstract

Poor electronic conductivity and sluggish ion diffusion are the two main obstacles that limit the pseudocapacitive performance of Fe_2O_3. In this work, oxygen-deficient $Fe_2O_{3-\delta}$ nanorod arrays with a unique crystalline core/amorphous shell heterostructure are prepared via a facile and controllable method. The tunable amorphous layer facilitates the Li^+ diffusion while introduced oxygen defects in Fe_2O_3 can be effectively tuned to improve electronic conductivity. More importantly, the resultant crystalline/amorphous interface greatly increases charge storage sites for improved specific capacitance. Consequently, the crystalline core/amorphous shell $Fe_2O_{3-\delta}$ integrated on graphene delivers a large capacitance of 701 F g^{-1} (701 mF cm^{-2}) at 1 A g^{-1}, which is almost double the capacitance of the conventional $Fe_2O_{3-\delta}$ nanorod