Abstract Submitted
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Supercapacitor Electrodes with High-energy and power densities prepared from monolithic NiO/Ni Nanocomposite[1] QI LU, University of Delaware — Despite significant progresses in the development for high-performance supercapacitors, it lacks techniques to realize the full potential of electrode material by achieving simultaneously tailored pore structure, electrode conductivity, and crystallinity. Moreover, the problem of being difficult for industrial scale manufacture still exists. For an attempt to address all these issues, we recently developed a simple and cost-effective process, which is also scalable, for achieving supercapacitor electrodes with both high energy and power densities. We first produce nickel nanoparticles with a modified polyol method. A simple mechanical compaction of nanoparticles and a followed thermal treatment result in compact, stable, highly porous Ni/NiO electrodes that do not require a support. During the charging process, OH^- electrolytic ions are bound to the NiO, giving off electrons. The process is reversed when the stored electrical energy is drawn off as current. The high granularity NiO provides a large inner surface area, and the conductive network of the metal particles is maintained. High energy density of about 60 Wh kg^{-1} and power density of 10 kW kg^{-1} were simultaneous achieved with a slow charge/fast discharge process.

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