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Fabrication of Three-Dimensionally Arrayed Polyaniline Nanostructures

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The supercapacitors with extraordinarily high capability for energy storage are attracting growing attention for their potential applications in portable electronic equipments, hybrid vehicles, cellular devices, and so on. The nanostructuring of the electrode surface can provide large surface area and consequently easy diffusion of ions in the capacitors. In addition, compared to two-dimensional nanostructures, the three-dimensional (3D) nano-architecture is expected to lead to significant enhancement of mechanical and electrical properties such as capacitance per unit area of the electrode. Polyaniline (PANi) is known as promising electrode material for supercapacitors due to its desirable properties such as high electro activity, high doping level and environmental stability. In this context, we fabricated well-ordered 3D PANi nanostructures on 3D polystyrene (PS) nanospheres which was arrayed by layer-by-layer stacking method. The height of the PANi nanostructures could be controlled by the number of PS layers stacked. 3D PANi hollow nanospheres were also fabricated by dissolving inner PS nanospheres, which resulted in further enhancement of the surface area and capacitance of the electrode.

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