IA-06

Flexible all-solid-state supercapacitors based on transition metal oxide nanocomposites

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In recent years, flexible all-solid-state supercapacitors (FASCs), as one of the most promising emerging energy storage devices, have attracted great attention to use as the power sources of portable and wearable electronic devices due to their high flexibility, small size, better safety operation and environmental benignancy. A series kind of FASCs based on Co_3O_4/rGO nanocomposite, MoS_2/rGO nanocomposite and $Ni(OH)_2$ nanoflowers electrodes were fabricated using KOH or K_2SO_4-PAAK gel as electrolyte. High specific capacitance were obtained for different materials, e.g., 190 F/g for Co_3O_4/rGO nanocomposites, 185 F/g for MoS_2/rGO nanocomposite and 1916 F/g for $Ni(OH)_2$ nanoflowers electrodes. Especially, the as-fabricated devices also showed good stability and excellent flexibility, an excellent cycling performance (capacitance retention of ~90%) after 10,000 cycles. The cyclic voltammetrys of SCs are almost unchanged and can work normally when its bent from 0 to 180°, exhibiting good flexibilities and reliabilities. In addition, a light-emitting diode, electronic watch and electronic scale are successfully powered by the as-fabricated SCs and can work for several minutes. All the performances have shown that the transition oxide nanocomposites could have potential practical applications in flexible energy storage devices in the future.