Short Communication

Electrochromic and Electrochemical Energy Storage Properties of Micro-nano Hierarchical NiO film

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Micro-nano hierarchical metal oxides offer unique advantages over traditional compact ones when serving as electrode materials, mainly because their good electrolyte wettability and high specific surface area can facilitate fast ion and electron transfer. Herein, we develop a facile route to fabricate micro-nano hierarchical NiO films for achieving enhanced bifunction of electrochromism and energy storage. The introducing of hierarchical structure effectively reduced the ion diffusion resistance and electron transfer resistance. As a result, hierarchical NiO films demonstrate superior electrochromic optical modulation and electrochemical energy storage compared with the compact ones. The transmittance change between the coloration and bleached states reaches 64.5% at 550 nm. Furthermore, the capacitance of hierarchical NiO is 14.85 F g^{-1} at 0.2 mA cm^{-2} , which is approximately 20% higher than that of the compact NiO (12.36 F g^{-1}). This work provides an efficient way to prepare high-performance hierarchical NiO films, which can be extended to the fabrication of other metal oxides for wide applications in the highly efficient electrochemical utilization.

Keywords: hierarchical structure, NiO, electrochromic property, energy storage

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