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An Electrode Material for Ultracapacitors: Hydrothermal Synthesis of Neodymium Oxide/Manganese Oxide/Nitrogen Doped Reduced Graphene Oxide Ternary Nanocomposites

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Abstract : The depletion of fossil resources and the rise in global temperatures are two of the most important concerns we confront today. There are numerous renewable energy sources like solar power, tidal power, wind energy, radiant energy, hydroelectricity, geothermal energy, and biomass available to generate the needed energy demand. Engineers and scientists around the world are facing a massive barrier in the development of storage technologies for the energy developed from renewable energy sources. The development of electrochemical capacitors as a future energy storage technology is at the forefront of current research and development. This is due to the fact that the electrochemical capacitors have a significantly higher energy density, a faster charging-discharging rate, and a longer life span than capacitors, and they also have a higher power density than batteries, making them superior to both. In this research, electrochemical capacitors using the Nd2O3/Mn3O4/ N-rGO electrode material is chosen since the of hexagonal and tetragonal crystal structures of Nd2O3 and Mn3O4 and also has cycling stability of 68% over a long time at 50mVs-1 and a high coulombic efficiency of 99.64% at 5 Ag-1. This approach may also be used to create novel electrode materials with improved electrochemical and cyclic stability for high-performance supercapacitors.

Keywords : Nd2O3/Mn3O4/N-rGO, nanocomposites, hydrothermal method, electrode material, specific capacitance, use of supercapacitors
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