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(54) **NANO-SCALED GRAPHENE PLATE NANOCOMPOSITES FOR SUPERCAPACITOR ELECTRODES**

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See application file for complete search history.

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(57) **ABSTRACT**

A preferred embodiment of the present invention is a mesoporous nanocomposite material comprising: (A) nano-scaled graphene platelets, wherein each of the platelets comprises a sheet of graphite plane or multiple sheets of graphite plane, and the platelets have a thickness no greater than 100 nm (preferably smaller than 10 nm) and an average length, width, or diameter no greater than 10  $\mu\text{m}$  (preferably smaller than 500 nm); and (B) an electrically conducting binder or matrix material attached or bonded to the platelets to form the nanocomposite material having liquid accessible pores, which provide a surface area greater than about 100  $\text{m}^2/\text{gm}$ , preferably greater than 500  $\text{m}^2/\text{gm}$ , and most preferably greater than 1000  $\text{m}^2/\text{gm}$ . Also disclosed is a capacitor that includes at least an electrode comprising such a meso-porous nanocomposite material. A supercapacitor featuring such a nanocomposite exhibits an exceptionally high capacitance value.

**24 Claims, 8 Drawing Sheets**

