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Intellectual Property Status:

Patent Pending

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Flexible, Efficient, and Inexpensive Facile Preparation Method for Nanoporous Materials

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Background

Because of their surface area and porosity, nanoporous materials are one of the most actively sought after materials in the modern technologies. They are finding use in a wide range of applications including microelectronics, medicine, energy storage, water purification, and environmental emissions. There are many differing methods of creating nanoporous materials. Current methods involve time-consuming post-gelation liquid exchange steps, while the invented process provides a faster and more cost effective way to create porous nanocomposites and porous metal oxides.

Invention Description

Researchers at Arizona State University have created a new facile preparation method for nanoporous materials. Selecting inorganic and carbon precursors that initiate gelation first, then utilizing the catalytic surface properties of inorganic wet gels to incite the polymerization of various monomers within the wet gel structure avoids time consuming post-gelation liquid exchange steps and is applicable even for fast gel formers. Final products include porous polymer/gel composites, conductive carbon monoliths, porous metal oxides and other porous nanocomposites.

Potential Applications

- Energy-Fuel Cells, Solar Cells, Electrodes, Batteries, Supercapacitors
- Environmental and Biomedical-Drug Delivery, Bioimplants, Sensors, Water Purification
- Adsorption and Catalysis
- Thermal Insulation
- Gas / Liquid / Fuel Storage

Benefits and Advantages

- Flexible process generates many different types of metal oxide composites and other nanoporous materials
- Cost effective process avoids time consuming post-gelation liquid exchange steps, significantly reducing time spent on drying
- Provides for the synthesis of previously unachievable high porosity oxides