Accelerated Technique for Carbon Mesoporous Materials

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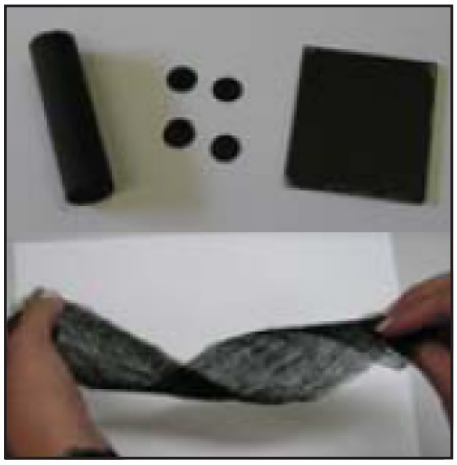

Technology Summary

ORNL has developed improved production that is both more efficient and less costly for carbon mesoporous materials with pore diameters between 2 and 50 nm. This accelerated production method offers a more resilient product for commercial use in gas separation, water filtration, and electrode materials.

Current methods of manufacturing these materials have been hindered by how long it takes organic compounds to react and cure into a polymer that can serve as a carbon framework. If rushed, conventional approaches yield an incompletely formed polymer, which leads to carbon materials that are prone to shrinkage, cracking, and a loss of porosity.

To resolve these issues, researchers at ORNL combined the curing and carbonization process. The precursor is mixed in a phenolic compound along with an aldehyde component. A strong acid is added until a gel-like phase and a liquid phase begin to separate. The gel is then cured. In the subsequent carbonization step, the precursor composition is heated to convert it to a mesoporous carbon material. The resulting highly efficient materials feature improved thermal stability and preservation of the porous surface area. These materials can be used for many applications that require exceptionally durable, heat-resistant carbon materials.

Advantages

- More efficient and cost effective production method for carbon mesoporous material
- Carbon material produced has improved thermal stability, less shrinkage, and sustained mesoporosity

Potential Applications

- Gas separation
- Water purification and nanofiltration
- Catalyst support
- Electrode materials

Patent

Sheng Dai, *Mesoporous Carbons Materials*, U.S. Patent Application 12/468 946, filed May 20, 2009.

Inventor Point of Contact

Sheng Dai
Chemical Sciences Division
Oak Ridge National Laboratory

Licensing Contact

Jennifer Tonzello Caldwell
Group Leader, Technology Commercialization
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865.574.4180
E-mail: caldwelljt@ornl.gov

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