NAVAL RESEARCH LABORATORY

TECHNOLOGY TRANSFER OFFICE

Reactive and Catalytic Air Purification Materials

Advantages/Features

Reactive and/or catalytic nature extends functional lifetime and removal capacity

Hierarchical morphology reduces diffusion limitations

High surface area, ~1,000 m^2/g

Tunable selectivity

Multiple possible material formats

Resistance to temperatures of up to 150°C

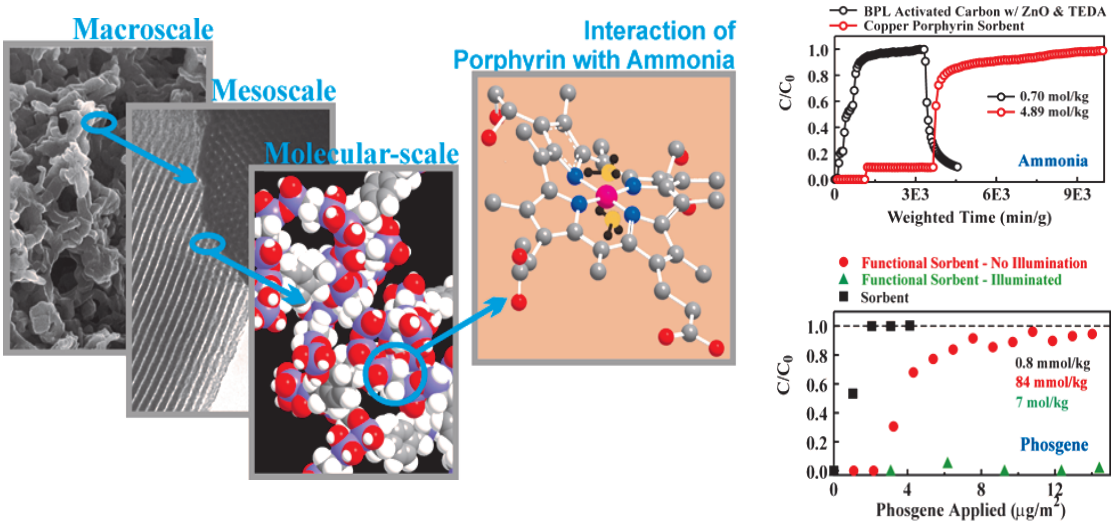
Applications

Catalytic air filters

Chemical protective masks

Self-decontaminating hardware

Catalytic membranes



The Naval Research Laboratory (NRL) has developed sorbents for the removal of toxic industrial gases such as ammonia and phosgene. The materials offer reactive and/or catalytic sites within a high surface area, hierarchical pore structure. The reactive/catalytic nature of the materials offers extended lifetimes to typical purification applications. The hierarchical nature of the materials reduces the diffusion limitations often experienced in high surface area sorbents. Catalytic activity can be stimulated through application of an electric current or illumination by visible spectrum light. Catalysis under a range of conditions including varied temperature and humidity has been demonstrated. Target selectivity can be controlled through selection of reactive components. Materials with catalytic activity against phosgene have been demonstrated. Removal of ammonia at 4.9 mol/kg has also been described. Incorporation of an optically active moiety offers the potential for self-reporting materials. Attachment of these types of materials to fabrics and surfaces has been demonstrated.

References

Related U.S. patent number 7,749,438 entitled “Fluorophore embedded/incorporating/bridged molecularly imprinted periodic mesoporous organosilicas (PMOs) as recognition elements for optical sensors”

Related U.S. patent number 7,754,145 entitled “Fluorophore embedded/incorporating/bridged molecularly imprinted periodic mesoporous organosilicas (PMOs) as photo-decontamination catalysts”

“Sunlight Catalyzed Conversion of Cyclic Organics with Novel Mesoporous Organosilicas” B. Johnson-White, M. Zeinali, A. P. Malanoski, M. Dinderman. *Catalysis Communications*, 8, 1052-6 (2007).

“Functional and Functionalized Silicate Materials” B.J. Johnson, B.J. Melde, B. Lin, P.T. Charles, A.P. Malanoski, M. Nasir. *Proceedings 2010 MRS Fall Meeting Symposium BB*, MRS Online Proceedings Library, 1306-BB02-07 (November 2010).

Licenses are available to companies with commercial interest.

technology

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