NAVAL RESEARCH LABORATORY

TECHNOLOGY TRANSFER OFFICE

Catalytic Self-Decontaminating Materials

Advantages/Features

Rapid target sequestration

Stimulation of catalysis by electric current or illumination

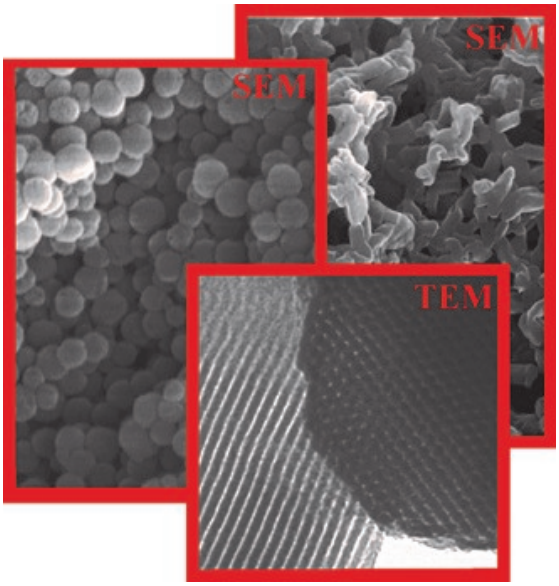
Tunable selectivity

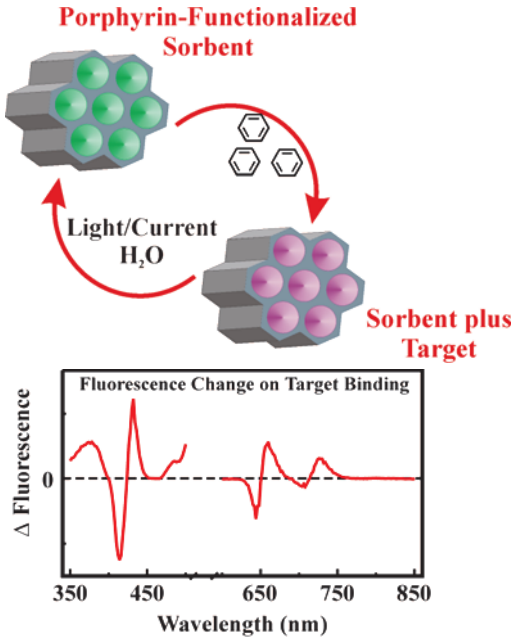
Multiple possible material formats

Resistance to temperatures of up to 150°C

Excellent chemical stability

Reusable / Regenerable





Applications

Catalytic surface coatings and fabrics

Chemical protective clothing

Self-decontaminating hardware

Catalytic membranes

The Naval Research Laboratory (NRL) has developed self-decontaminating structures based on porphyrin-embedded, target imprinted, porous, organosilicate sorbents. The materials rapidly sequester targets as a result of the affinity of the sorbent structures. Catalysis proceeds upon stimulation of the porphyrin moieties through illumination or by an applied current. This potential for dual stimulation provides the opportunity for utilization of the materials in sunlit or low light environments. Catalysis in aqueous solution and under ambient conditions in the absence of liquid water has been demonstrated. Target selectivity can be controlled through selection of porphyrin and sorbent characteristics. The spectrophotometric characteristics of the porphyrin catalytic component also offer the potential for self-reporting materials. Attachment of the materials to fabrics and surfaces has been demonstrated using standard techniques. Materials with activity against organophosphate pesticides, aromatic solvents, and nitroenergetics have been described.

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).

“Porphyrin-embedded organosilicas for detection and decontamination,” B.J. Johnson, B.J. Melde, P.T. Charles, A.P. Malanoski. *Proceedings SPIE Defense, Security, and Sensing: Optics and Photonics in Global Homeland Security V* (April 2009) v.7306, 73060E-1 to -11.

Licenses are available to companies with commercial interest.

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