

## MOFs as Porous Hosts for Generating Singlet Oxygen

John C. MacDonald, Alwin Schwehr, Francisco J. Rosales Espinoza, Jiawei Lu, U Shwe Thein

Department of Chemistry & Biochemistry, Worcester Polytechnic Institute,  
Worcester, MA 01609

We are investigating photoactive porous solids that produce singlet oxygen and oxidize adsorbed guest molecules in an effort to develop heterogeneous catalytic materials for remediation of contaminated water sources. Toward that goal, we have synthesized porous metal-organic frameworks (MOFs) featuring photosensitizing porphyrins in the backbone of the MOF, investigated their structures, stabilities, and porous behavior, and demonstrated photolytic generation of singlet oxygen by monitoring oxidation of a model contaminant, 1,3-diphenylisobenzofuran, using spectroscopic and electrochemical methods. We have shown that immobilizing porphyrins in the backbone of MOFs inhibits photobleaching of the photosensitizer, thereby preventing degradation of the MOF and catalytic activity over time. We also have developed a strategy to seal the outer pores of MOFs as a means to trap adsorbed guests with MOFs.