

## Delivering Toxic Gases for Therapeutic Benefit

**John B. Matson, Ph.D.**  
Department of Chemistry  
*Virginia Tech*  
Blacksburg, VA 24061

Despite its reputation as a foul-smelling and toxic pollutant, H<sub>2</sub>S is a vital biological signaling agent, and it is of interest as a therapeutic for a variety of diseases and conditions. We focus on developing new small molecules, polymers, and supramolecular materials for the delivery of hydrogen sulfide (H<sub>2</sub>S). The majority of biological studies on this gasotransmitter have been carried out with systemically administered small molecule H<sub>2</sub>S donors, which have little tissue specificity, fast release, and the potential for off-target effects. We address these shortcomings by developing new H<sub>2</sub>S-releasing small molecules with controllable triggers and release kinetics. These small molecules are then incorporated into new materials, which can offer localized H<sub>2</sub>S delivery with tunable kinetics. Our platforms include soluble polymers and peptide-based gels designed to release therapeutically relevant concentrations of H<sub>2</sub>S with controllable kinetics.