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Eawag Seminar Invitation

Tuning MOF Structures to Achieve High Performance in Liquid-Based Separation

Speaker **Prof. Wendy L. Queen**
EPFL Valais, Laboratory for Functional Inorganic Materials (LFIM), Sion, Switzerland

When **October 4, 11.00 – 12.00 a.m.**
Where **Forum Chriesbach, room C20, Eawag Dübendorf**

Abstract Metal-organic frameworks (MOFs) have gained much attention as next generation porous media for various applications, especially gas separations/storage and catalysis. These materials, constructed by metal-ions or metal-ion clusters that are interlinked by organic ligands, offer unprecedented internal surface areas allowing the adsorption of a wide range of guest species. The molecular nature of the organic ligands within the hybrid organic/inorganic newcomers, induces structural versatility, allows the introduction of multifunctional properties, and permits a modular approach to their design. In these ways MOFs, which offer unmatched opportunities to achieve optimal efficiencies in many environmentally relevant applications, are unique relative to their all-inorganic counterparts.

Recently, our group has begun to decorate the internal surface of MOFs with high densities of metal scavenging functionality for applications in water purification. For this, we have used a cheap, environmentally friendly MOF template, Fe-BTC, to introduce extrinsic porosity to a series of polymers that contain high densities of Lewis base functionalities, such as amines, catechols, and thiols. This functionality not only promotes the rapid extraction of selected metals, such as lead, mercury, and gold, from a variety of complex solutions, but also provides a pathway to adhere the polymer onto the internal MOF surface. The latter inhibits the dispersion of the hydrophilic polymer into water and thus promotes facile separation post-water treatment. In this presentation, examples of several resulting MOF composites will be shown, demonstrating their application in the removal of heavy metals and precious metals from highly complex water mixtures such as sea water, river water, and waste water.