The Red Planet and The Blue Planet: Past, Present and Future Symposium Speakers

Nanoporous Materials for Energy Related Applications

Presented by:

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Professor Pingyun Feng received her PhD in 1998 from Department of Chemistry, University of California, Santa Barbara (UCSB). After two years of postdoctoral study at Department of Chemical Engineering, UCSB, she joined University of California, Riverside in 2000. Professor Feng's research focuses on the synthesis, characterization, and application of various types of functional solid-state materials. These materials range from porous metal-organic framework materials to high-surface area semiconductors based on metal chalcogenides. Her group has published more than 256 peer-reviewed scientific papers, most of which are in prestigious high-impact journals. Her accomplishments have been recognized by the Beckman Young Investigator Award, NSF CAREER Award, Camille Dreyfus Teacher-Scholar Award, and Alfred P. Sloan Fellowship award. She received the ACS 2017 F. Albert Cotton Award in Synthetic Inorganic Chemistry and the 2020 Richard C. Tolman Award from the Southern California Section of the American Chemical Society. She is currently a Distinguished Professor and holds the Harry W. Johnson, Jr. Founder's Chair in Chemisty at UCR.

Abstract:

The presentation will focus on two types of porous materials. One is metal chalcogenide tetrahedral clusters that can self-assemble to form zeolite-type crystalline porous materials. Single-sized tetrahedral metal chalcogenide clusters act as building blocks to form well-ordered three-dimensional zeolite-type materials.

The structural analysis based on single crystals reveals detailed compositional and structural information. The materials can act as a host for different catalytic nanomaterials for photo- or electro-catalytic conversion of CO2 or water to useful chemicals. The second type of porous materials is metal-organic framework materials (MOFs). Strategies for the synthesis of new porous MOFs will be discussed, with the focus on the use of different metallic elements and their various combinations.

In addition, the talk will cover our recent efforts and strategies developed on functionalizing MOF for enhanced gas sorption through pore space partition. The pore space of MOF can be engineered by using extra-framework ligands, metal complexes. The materials demonstrate potential applications for fuel gas storage (e.g., H2, CH4), gas separation (e.g., C2H2/CO2, C2H4/C2H6, C3H6/C3H8), and harmful gas removal and sequestration (e.g., CO2, NH3).