

SMS Spring 2024 Seminar Series

Friday February 2 | 3:00 pm | Biodesign Auditorium

Anion Recognition as the Primary Layer in Hierarchical Materials

Ions are intimately related to the sustainable and technological development of our society. These roles motivated the creation of ion receptors and led to the exploration of ion-driven materials. Cations have enjoyed the lion's share of attention. By contrast, anions have barely had a look in, usually playing second fiddle to cations in molecular assembly. Yet anions are just as important with dihydrogen-phosphate (H_2PO_4^-) being an essential part of fertilizer, and hexafluoro-phosphate (PF_6^-) the workhorse electrolyte of Li^+ batteries. This talk will cover recent works binding anions to synthetic receptors using weak CH H-bonding. Despite their weakness, we show the strongest chloride affinities in a 3D cage. This growing mastery of anion coordination has allowed us to flip the script. Now it is the anions that take the lead in forming functional hierarchical materials. This talk will showcase use of anion-driven supramolecular polymers (top image) and our discovery of the brightest fluorescent materials (bottom image) inside lattices we call SMILES with embodiments in crystals, polymers and nanoparticles.

Amar Flood, PhD

Professor, Indiana University

Amar Flood was educated at Otago University, New Zealand (BSc with 1st Class Honors, 1996; PhD 2001) under the supervision of Keith C. Gordon. He joined the group of Sir Fraser Stoddart (2002) at UCLA as a postdoctoral scholar conducting research on interlocked molecules and molecular switches. He started at Indiana University in 2005 as an Assistant Professor, was promoted to Associate Professor in 2011, named the James F. Jackson Associate Professor in 2014, and was promoted to full Professor and named the Waterman Professor in 2015. He was Director of Graduate Studies from 2013-2019. He conducts research on anion recognition using CH hydrogen bonds, molecular switches, ultrabright fluorescent materials by theory- and data-driven design, and applications of anion recognition. He has 174 papers, 8 patent actions and cofounded the start-up, Halophore, Inc. He has co-organized three international symposia, chaired multiple scientific symposia including NSF and GRC sponsored meetings, is currently funded by the NSF and DOE, and he is an NSF CAREER recipient, a Camille Dreyfus Teacher-Scholar and ACS Awardee.

