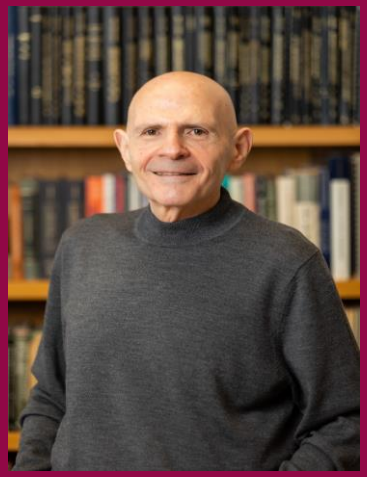
SMS Spring 2025 Eyring Lecture Seminar



Samuel (Sam) Stupp, PhD

Professor, Departments of Chemistry, Materials Science and Engineering, Medicine, and Biomedical Engineering
Northwestern University

"Dynamic Supramolecular Materials: Four-Dimensional Structures"

Friday, February 21, 2025
3:00 PM
PSF-166

Supramolecular chemistry, a key ingredient in the materials of life, will be necessary to create the functional structures of great importance to our future. The emerging platforms range from molecular organic and covalent frameworks to supramolecular polymers and hybrid forms where infinite lattices or macromolecules are integrated with small molecules. The common denominator of the strategies is design of primary structure programmed for functions through self-assembly across scales. Our laboratory has focused over the past few decades on this journey using bio-inspired supramolecular engineering of materials. Very recently we have discovered that designing structures not only for structure, which is traditional, but also for supramolecular motion to create highly dynamic materials, it is possible to mine breakthrough functions. So far, we have seen breakthroughs in materials to regenerate the brain and spinal cord which could be expanded broadly into therapeutic platforms, and also in supramolecular ferroelectrics which could store information or energy. In these new hybrid materials inspired by proteins and plastics, ferroelectric materials are generated in which specific function is connected to peptide sequences and their impact on supramolecular dynamics. We think of these recently discovered dynamic supramolecular materials as four-dimensional structures in which time is an important axis.

Dr. Samuel Stupp is Board of Trustees Professor of Materials Science and Engineering, Chemistry, Medicine, and Biomedical Engineering at Northwestern University. He also directs Northwestern's Center for Regenerative Nanomedicine.

Stupp's interdisciplinary research is focused on developing self-assembling supramolecular nanostructures and materials for functions relevant to renewable energy, regenerative medicine, and robotic soft matter. He is a member of the U.S. National Academy of Sciences, the U.S. National Academy of Engineering, the American Academy of Arts and Sciences, the Royal Spanish Academy, the National Academy of Sciences of Latin America, the National Academy of Sciences of Costa Rica, and the U.S. National Academy of Inventors.

Stupp has won numerous awards over the course of his career, including three American Chemical Society national awards: the Award in Polymer Chemistry, the Ronald Breslow Award for Achievement in Biomimetic Chemistry, and the Ralph F. Hirschmann Award in Peptide Chemistry. He recently received the 2022 Materials Research Society Von Hippel Award, the highest honor awarded by this society. Other awards include the Department of Energy Prize for Outstanding Scientific Accomplishment in Materials Chemistry, the Materials Research Society Medal Award, the Royal Society of Chemistry Award in Soft Matter and Biophysical Chemistry, and the Nanoscience Prize from the International Society for Nanoscale Science, Computation, and Engineering, which recognizes lifelong achievement in the field.

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ASU School of Molecular Sciences
Arizona State University