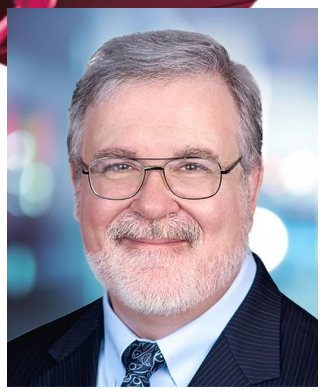
24 de Febrero de 2026

12:00
Sala de Grados
Facultad de Ciencias (Ed. A)



Advances in Functional and Stimuli-Responsive Thermoplastic Elastomers

Richard J. Spontak

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About the speaker: Richard Spontak received his B.S. and Ph.D. degrees in chemical engineering from Penn State University and U.C. Berkeley, respectively, and pursued post-doctoral studies at Cambridge University (UK) and the Institute for Energy Technology (Norway) before joining the Procter & Gamble Co. in 1990. In 1992, he transitioned to NC State University, where he is currently a Distinguished Professor. He has published >300 peer-reviewed journal papers, and he has presented >400 invited lectures worldwide. In recognition of his research, he has received numerous honors including the ACS Chemistry of Thermoplastic Elastomers Award (Rubber), the ACS Tess Award in Coatings (PMSE), the SPSJ International Award, the IOM3 Colwyn Medal and Medal for Excellence, the SPE International Award, and the NC State Holladay Medal. He is a fellow of the RSC, IOM3, SPE, and ACS-POLY/-PMSE and a member of the Norwegian Academy of Technological Sciences. He holds an honorary doctorate from NTNU.

Abstract: Numerous designer polymers have been developed to address the growing number of needs in all technological areas. We pose the question, "Can one technology platform be made sufficiently versatile and robust so that it can significantly benefit many, but certainly not all, of society's needs?" For this purpose, we elected to use thermoplastic elastomers (TPEs), a class of self-networking macromolecules that are currently used in numerous commodity applications. In other words, these materials are abundantly available, and new ones are being synthesized from sustainable sources. Because of their innate ability to form networks and impart elasticity, we can exploit their mechanical properties while functionalizing them for specific applications. Here, several of these applications will be addressed, ranging from low-modulus, super stretchy and precisely thermoresponsive soft materials to tunable compatibilizers and rubber-toughening agents in polymer blends. Of particular interest here are functionalized TPEs for use as gas-separation membranes to remove basic (NH_3) and acid (CO_2) gases from gas mixtures, solar cells that can be designed to mimic leaves or function as dye-sensitized devices, antimicrobial materials that can kill (to 99.9999+%) Gram-positive/negative and drug-resistant bacteria, viruses (including SARS-CoV-2) and fungi in ~5 min, and a replacement for Nafion as the anionic exchange membrane in bipolar membranes to achieve efficient water dissociation for green hydrogen production or atmospheric/oceanic carbon capture.

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