SWAXS studies performed at the University of Pennsylvania

Karen Winey group (MSE): Uses the DEXS facility to study and design functional polymers to improve ion and proton conductivity targeting a variety of energy applications. The newest project focuses on polymer-to-polymer upcycling to convert waste polyolefins to higher value polymers.

Russell Composto group (MSE): One of the projects that involves SAXS studies aims to provide strategies for designing of separation, sensing, and purification devices with improved performance. Another project focuses on the infiltration kinetics of polymers into nanoporous gold.

Eric Detsi group (MSE): Uses DEXS to perform *in-situ* experiments to visualize the microstructure evolution in real time during plating and stripping targeting to investigate actuation mechanism of nanoporous silver.

Chinedum Osuji group (CBE): One of the projects that uses DEXS investigates changes to film dimensions as a function of tensile stress and humidity, the impact of self-assembled mesophase on conductivity, and the development of ultrathin membranes for nanofiltration. Another project focuses on fabrication of liquid-crystal nanoporous membranes that will be used for ion transport, desalination, anti-fouling.

Zahra Fakhraai group (Chemistry): Uses DEXS to characterize the molecular packing structure and density distribution of organic thin films aiming to design ultra stable glass thin films.

Shu Yang group (MSE): Uses DEXS to characterize the functional fibers, yarns, and textiles that offer a completely new paradigm to engineer flexible, breathable and foldable materials. These materials innovate textile-based wearable technologies, soft and hybrid robots, and biomedical applications.

Selected Penn publications based on SWAXS studies

1. J. Park, A. Staiger, S. Mecking, and K. I. Winey, Ordered Nanostructures in Thin Films of Precise Ion-Containing Multiblock Copolymers, *ACS Cent. Sci.* **2022**, 8, 388−393. https://doi.org/10.1021/acscentsci.1c01594
2. Y. Kim, R. J. Composto, and K. I. Winey, pH-Mediated Size-Selective Adsorption of Gold Nanoparticles on Diblock Copolymer Brushes, *ACS Nano* **2023**, 17, 9224−9234. https://doi.org/10.1021/acsnano.3c00212
3. S. M. Maguire, et al., Effect of Nanoscale Confinement on Polymer-Infiltrated Scaffold Metal Composites, *ACS Appl. Mater. Interfaces* **2021**, 13, 44893−44903 https://doi.org/10.1021/acsami.1c12491
4. J. S. Corsi, et al. Sacrificial Silver Recovery during Nanoporous Gold Formation by Electrolytic Dealloying of Gold-Silver Alloy, *Journal of The Electrochemical Society*, **2022**, 169, 063501. DOI: 10.1149/1945-7111/ac6344
5. T. Lee, et al. Ultrafine nanoporous aluminum by electrolytic dealloying of aluminum-magnesium alloys in glyme-based electrolytes with recovery of sacrificial magnesium, *Scripta Materialia,* **2022**, 221, 114959. https://doi.org/10.1016/j.scriptamat.2022.114959
6. L. N. Bodkin, et al., Cross-linkable, phosphobetaine-based, zwitterionic amphiphiles that form lyotropic bicontinuous cubic phases, *Soft Matter*, **2023**, 19, 3768–3772. DOI: https://doi.org/10.1039/d3sm00269a
7. P. Luo and Z. Fakhraai, Surface-Mediated Formation of Stable Glasses, *Annual Review of Physical Chemistry,* **2023**, 74, 361–389. https://doi.org/10.1146/annurev-physchem-042018-052708
8. Jiaqi Liu, et al., Shaping and Locomotion of Soft Robots Using Filament Actuators Made from Liquid Crystal Elastomer–Carbon Nanotube Composites, *Adv. Intell. Syst*. **2020**, 2, 1900163. DOI: 10.1002/aisy.201900163