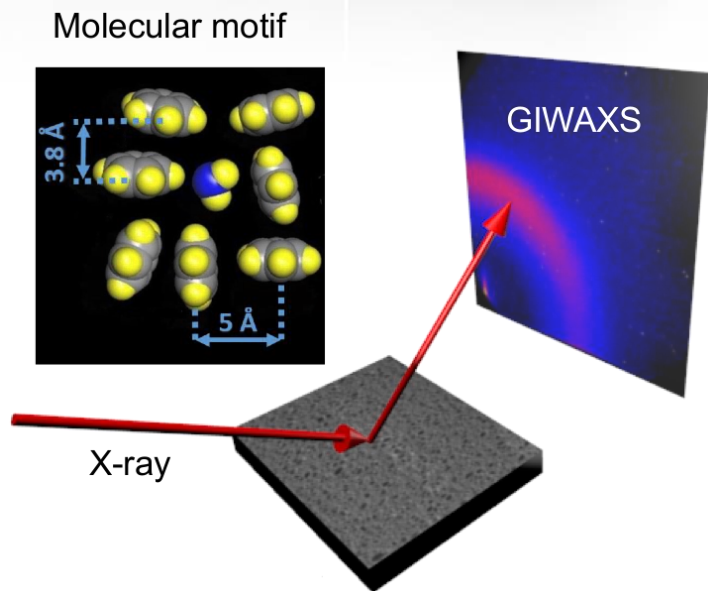


Illuminating Desalination Membranes

Beamlines: CMS & SMI



The sketch shows x-rays scattering from the membrane surface into a detector to create a GIWAXS image. The top left panel shows two different molecular scale packing motifs. GIWAXS results suggest that the perpendicular motif (lower right) is correlated with superior filtration properties.

Q. Fu, N. Verma, H. Ma, F. J. Medellin-Rodriguez, R. Li, M. Fukuto, C. M. Stafford, B. S. Hsiao, B. M. Ocko. *ACS Macro Lett.* **8**:352-356 (2019).

Work was performed in part at Brookhaven National Laboratory

Scientific Achievement

Scientists revealed the molecular structure of polymer membrane materials used in reverse osmosis (RO) water purification.

Significance and Impact

RO is the leading method of converting seawater into potable water; understanding the polymer structure and its correlation with filtration properties will aid in the development of more efficient membranes.

Research Details

- Thin, well-defined polymer RO barrier layers were prepared at the water/oil interface.
- X-ray reflectivity acquired at the CFN was used to measure their thickness.
- Grazing-incidence wide-angle x-ray scattering at NLSL-II beamlines 11-BM and 12-ID was used to investigate the molecular packing.
- Two molecular motifs were found, one of which seems to correlate with better filtration properties.