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**Watching Molecules Near Surfaces: Vibrational Spectroscopy in a Confined Geometry** SHAN JIANG, Department of Materials Science and Engineering, University of Illinois, JEFF TURNER, SUNG CHUL BAE, MALGORZATA GRACA, STEVE GRANICK — It is a long standing interest to know the structure of liquid near a surface. Seeking more direct information than available from force measurements, and more time-resolved information than available from scattering measurements, we have developed an experimental platform that combines the Surface Forces Apparatus (SFA) with in situ vibrational spectroscopy. Using confocal Raman and surface enhanced Raman (SERS) spectroscopy, new direct information has been obtained about how polymers align in molecularly-thin films, when confined to thickness less than the unperturbed radius of gyration. In another set of experiments, we use nonlinear broadband sum frequency generation (SFG) spectroscopy to probe the structure of aqueous systems near hydrophobic and electrochemical surfaces, without background from the bulk.

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