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Hybrid static/fluidic synthetic substrates to interface living and nonliving THEOBALD LOHMUELLER, University of California, Berkeley; Lawrence Berkeley National Laboratory, JAY T. GROVES, University of California, Berkeley; Lawrence Berkeley National Laboratory; Howard Hughes Medical Institute — The goal of our project is the development of novel nano-patterned synthetic materials to establish functional interfaces between living cells and nonliving devices. In particular, we focus on spatial and mechanical aspects of how cells interact with specific signaling molecules. Quasi-hexagonal arrays of gold nanoparticles serve as static anchor points for proteins. The particle size can be adjusted in the range of 2-50 nm to match the structural dimensions of cell membrane receptors. The deposition of a lipid bilayer between the particles results in a system where certain molecules are tethered at the interface with nanoscopic precision, while membrane bound molecules are able to diffuse freely on the surface. By mimicking biological interfaces with defined chemical composition and physical properties, we aim to characterize the coupling mechanisms that link cytoskeletal dynamics to chemical signaling pathways inside living cells.

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