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Tuning the Dynamics of Particles and Drops at Engineered Nanostructured Interfaces CARLOS COLOSQUI, State Univ of NY- Stony Brook, ANTONIO CHECCO, Brookhaven National Laboratory — Harnessing the full potential of current nanofabrication capabilities requires significant progress in understanding non-equilibrium phenomena produced by nanoscale interfacial structure and thermal motion. In diverse colloidal systems relevant to complex fluids and soft materials, the nanoscale interfacial structure can induce transitions from fast dynamics dominated by (deterministic) hydrodynamic and surface forces to arrested dynamics dominated by (random) thermally-activated processes. Recent work provides guidelines for engineering geometries and surface structures to tune the dynamic behavior of nano/microscale particles and droplets. For example, small reductions of the radius of a microparticle can lead to dramatic increases in the time for adsorption at liquid interfaces or membranes. Similarly, reducing the radius of a millimeter-sized droplet can lead to arrested spreading dynamics with logarithmic-in-time relaxation. Furthermore, nanostructured surfaces with directional asymmetry can convert thermal motion into directed transport processes at controllable rates. This talk will discuss theoretical and computational predictions that have been confirmed in recent experimental work by our and other groups and new predictions that can guide future experimental studies

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