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Visualizing Nanoscopic Topography and Patterns in Freely Standing Thin Films. SUBINUER YILIXIATI, YIRAN ZHANG , COLLIN PEARSALL , VIVEK SHARMA, Chemical Engineering, Univ of Illinois - Chicago — Thin liquid films containing micelles, nanoparticles, polyelectrolyte-surfactant complexes and smectic liquid crystals undergo thinning in a discontinuous, step-wise fashion. The discontinuous jumps in thickness are often characterized by quantifying changes in the intensity of reflected monochromatic light, modulated by thin film interference from a region of interest. Stratifying thin films exhibit a mosaic pattern in reflected white light microscopy, attributed to the coexistence of domains with various thicknesses, separated by steps. Using Interferometry Digital Imaging Optical Microscopy (IDIOM) protocols developed in the course of this study, we spatially resolve for the first time, the landscape of stratifying freestanding thin films. In particular, for thin films containing micelles of sodium dodecyl sulfate (SDS), discontinuous, thickness transitions with concentration-dependent steps of 5-25 nm are visualized and analyzed using IDIOM protocols. We distinguish nanoscopic rims, mesas and craters and show that the non-flat features are sculpted by oscillatory, periodic, supramolecular structural forces that arise in confined fluids

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