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Liquid precursor films spreading on chemically patterned substrates[1] ANTONIO CHECCO, Condensed Matter Physics and Materials Science Dept, Brookhaven National Laboratory — We study the spreading of nonvolatile liquid squalane on chemically patterned nanostripes by using non-contact Atomic Force Microscopy (NC-AFM). The substrates are octadecylthrichlorosilane(OTS)-coated silicon wafers chemically patterned on multiple length-scales using a combination of UV and AFM oxidative lithographies. This process allows us to locally convert the terminal methyl groups of the OTS surface (non-wettable) into carboxylic acid groups (wettable) without affecting considerably the substrate roughness (< 0.3nm rms). The patterned regions are shaped as a network of large (mm-sized) wettable lines connected to smaller and smaller (nm-sized) lines. Liquid squalane spreads across this "microfluidic network" starting from the large lines eventually reaching the nanolines (50 to 500 nm-wide). NC-AFM is used to image the morphology of the liquid as it spreads across the nanolines. We find that the liquid thickness on the nanolines grows with time (up to $\sim$10 nm) according to a power-law with exponent $\sim$1. These preliminary results suggest that the spreading dynamics of laterally-confined liquids slightly differs, as expected, from the one of laterally homogeneous precursor films. We compare our findings to recent theoretical predictions of confined liquid flow and also discuss its relevance to nanofluidics.

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