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Drop-on-Demand Based Inkjet Printing for Making Patterned Surfaces with Controlled Surface Wetting. AMIT SANKHE[1], MICHAEL KILBEY[2], Department of Chemical Engineering, Clemson University, Clemson, SC 29634, USA — Combining inkjet printing and atom-transfer radical polymerization (ATRP) provides a facile and versatile method for producing patterned surfaces that may serve as platforms for a variety of applications. We report the use of drop-on-demand technology to print chemically-graded interfacial layers or simple patterns that allow surface wetting characteristics to be tailored. Inkjet printing can be coupled with surface-confined ATRP to amplify the printed patterns and gradients. Chemically graded monolayers prepared by inkjet printing dodecanethiol and backfilling with 11-mercaptoundecanol showed continuous changes in water contact angle along the gradient. These samples also exhibited a distinct change in the intensity of methyl group and C-O stretching modes along the gradient. Graded or patterned polymer layers were produced by growing, with ATRP, tethered poly(methyl methacrylate) (PMMA) layers from gradient or patterned printed monolayers that contained an ATRP initiator. Atomic force microscopy and optical microscopy confirmed that the PMMA layers amplified the underlying printed layer with fidelity that agrees with the printer resolution.

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