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**Soft Nanoimprint Lithography for Direct Printing of Crystalline Metal Oxide Nanostructures** ROHIT KOTHARI, MICHAEL BEAULIEU, JAMES WATKINS, Univ. of Massachusetts Amherst — We demonstrate a solution-based soft nanoimprint lithography technique to directly print dimensionally-stable crystalline metal oxide nanostructures. A patterned PDMS stamp is used in combination with a UV/thermal cure step to imprint a resist containing high concentrations of crystalline nanoparticles in an inorganic/organic binder phase. The as-imprinted nanostructures are highly crystalline and therefore undergo little shrinkage (less than 5% in some cases) upon thermal annealing. High aspect ratio nanostructures and sub-100 nm features are easily realized. Residual layer free direct imprinting (no etching) was achieved by choosing the resist with the appropriate surface energy to ensure dewetting at stamp-substrate interface. The technique was further extended to stack the nanostructures by deploying a layer-by-layer imprint strategy. The method is scalable and can produce large area device quality nanostructures in a rapid fashion at a low cost. $CeO_2$, ITO and $TiO_2$ nanopatterns are illustrated for their potential use in fuel cell electrodes, solar cell electrodes and photonic devices, respectively.

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