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Surface patterning by using plastic deformation ATSUSHI TAKEI, Univ. of Tokyo, LIHUA JIN, Harvard University, HIROYUKI FUJITA, Univ. of Tokyo — We presents a method of surface patterning using plastic deformation. Localized deformation pattern is formed on a surface of a bi-layer system composed of elastic substrate and plastic thin film. With the stretch beyond the yield stress of the film, the film is deformed plastically, and the mismatch of the lengths between the film and the substrate is induced at the release of the stretch. Consequently, the mismatch induces buckling on the surface. With the stretch λ_0 ¿ 1.5, the deformation of the surface is localized unlike conventional wrinkle patterns. The localized deformations of the bi-layer system both in one-dimension and in two-dimension are analyzed through experiments and simulations. Besides the theoretical aspect, we present that our method achieves functional surfaces such as a hydrophobic surface in a simple manner, and also present that our method can be used for surface patterning of a wide variety of geometry such as a flat plane, fiber and micro -channel.

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