

## **Buckling-Induced Patterning of PDMS Surfaces Through Argon Ion Bombardment**

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**Abstract:** Buckling, which relates to the onset of an elastic instability in which an in plane compressive force causes an out of plane deformation has been extensively studied within structural mechanics in an effort to avoid failure of columns or other compressively loaded elongated members. More recently, buckling has also been associated with the formation of patterns and morphological features that can either naturally occur (i.e., fingerprints) or engineered for specific applications. We here report on the formation of buckling induced wrinkling patterns on the surface of PDMS through argon ion bombardment. When argon ions are accelerated on the PDMS surface a hard thin film is generated through change in chemistry and the internal stresses generated during the thin film growth trigger the buckling instability of the surface that patterns the material with specific length characteristics. The effect of ion energy and fluence on the resulting patterns are studied using AFM, SEM and uv-vis spectrophotometry. The morphological details of the surfaces and subsequently its wetting and optical characteristics of the surface can be controlled indirectly through the ion characteristics, with potential applications of the produced surfaces in antibacterial coatings, energy harvesting materials, microfluidic devices, etc.