Pinning of graphene for conformal wrinkling over a soft corrugated substrate through prestretch-release process

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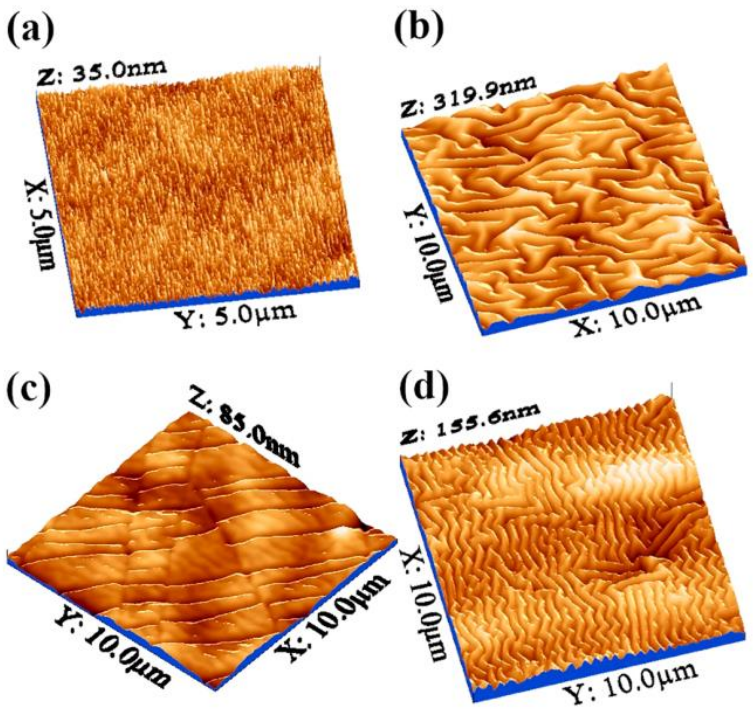

Figure : AFM topographic 3D images of (a) the flat & smooth surface of a pristine PDMS substrate, and (b, c, and d) rippled PDMS surfaces obtained through Ion beam irradiation at angles of incidence of 0° , 30° , and 60° , respectively, with respect to a normal to the PDMS substrate's surface.

2D material, graphene shows remarkable mechanical strength as it can withstand a mechanical strain up to ~ 20% before rapture. Hence these are promising materials for wearable electronics. In this work we have shown the impact of the substrate's topography on the buckling behaviour of the graphene membrane under the stress loading-unloading cycle by surface engineering of the PDMS substrate using ion beam irradiation. This study offers insights into the adhesion mechanics over the corrugated soft substrates. The wrinkled topography of the membrane could be harnessed for flexible, formal, and tuneable electronic devices.

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