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Abstract

We report the nano-mechanical properties of ion beam induced physicochemically periodic nanostructured silicon surfaces. The periodic nano-ripple structures are developed by 8 keV nitrogen ion (N^+) bombardment at an oblique angle. During structure formation the nitrogen atoms are preferentially implanted at one side of the ripples, resulting in a chemical periodicity following the morphological period. X-ray photoelectron spectroscopy measurements of N^+ bombarded Si surface show that the implanted nitrogen atoms form silicon nitride at the implanted zones. Atomic force microscopy height measurement shows the periodic ripple structure while the force distance curve at every point reveals spatially resolved periodic modulus and adhesion properties due to site-selective nitrogen implantation and subsequent nitride formation.

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