

Advances in Mesoscale Contact Mechanics

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We report on novel Atomic Force Microscopy (AFM) experiments devoted to the investigation of adhesive effects at the mesoscale. Custom-designed elastomer colloidal AFM probes are pressed against atomically-smooth and nanostructured rough surfaces, force-displacement curves being recorded as a function of loading parameters. A similar set-up efficiently probes the relationship between Van der Waals adhesion and roughness effects, therefore it allows to test existing contact mechanics theories and suggests potential control of adhesion through morphological patterning of interfaces. With respect to this point we discuss the use of elastomer AFM probes for studying biologically-inspired attachment devices.