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Drop impact dynamics of complex fluids on dry, nanotextured surfaces KYOO-CHUL PARK, VIVEK SHARMA, Dept of Mechanical Eng., MIT, ROBERT E. COHEN, Dept of Chemical Eng., MIT, GARETH H. MCKINLEY, Dept of Mechanical Eng., MIT — The deposition of aqueous drops on non-wetting surfaces is an important problem for many applications, including spraying of pesticides and herbicides onto plant leaves. The addition of a small amount of high molecular weight polymer has been demonstrated to suppress drop rebound. The high extensional viscosity of polymer solutions and increased dissipation in polymer solutions near the receding contact line are cited as two distinct antirebound mechanisms. Using drop impact experiments on both natural and synthetic micro- and nano-textured surfaces with controlled wetting characteristics we examine the role of viscosity, surface tension, elasticity and inertia on expansion, retraction, and rebound of well-characterized viscoelastic fluids. By varying the radius of gyration of the polymer coils in solution as well as texture length scale, we can achieve complete drop rebound on nanotextured surfaces even for high molecular weight polymer solutions. By contrast, in similar conditions on natural microtextured surfaces complete adhesion is observed.

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