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Repeated bouncing of drops on wetting and non-wetting surfaces mediated by a persisting thin air film JOLET DE RUITER, RUDY LAGRAAUW, DIRK VAN DEN ENDE, FRIEDER MUGELE, MESA+ Institute for Nanotechnology, University of Twente — Liquid drops impinging onto solid surfaces undergo a variety of impact scenarios such as splashing, sticking, and bouncing, depending on impact conditions and substrate properties. Bouncing requires efficient conversion of initial kinetic energy into surface energy and back into kinetic energy. This process is believed to be limited to non-wetting, in particular superhydrophobic surfaces, for which viscous dissipation during drop-substrate contact is minimal. Here, we report a novel bouncing mechanism that applies equally to non-wetting and wetting systems for flat surfaces with contact angles down to 10 degrees. For initial impact speeds up to about 0.5 m/s we demonstrate using dual wavelength interferometry that aqueous and non-aqueous drops remain separated from the substrate by air films of (sub)micrometer thickness at all times throughout a series of up to 16 consecutive bouncing events. We show that the purely dissipative force arising from the viscous squeeze-out of air is responsible for both the momentum transfer and for a substantial part of the residual energy dissipation.

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