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**Substrate topography-mediated air film collapse below an impacting drop** JOLET DE RUITER, DIRK VAN DEN ENDE, FRIEDER MUGELE, University of Twente — Liquid drops hitting solid surfaces are slowed down by the ambient air layer that needs to be squeezed out before the liquid actually touches the solid. How does substrate topography mediate the collapse of the air film? For moderate velocity impacts (Weber number around unity) we show that a drop gently spreads on an undulated air layer that thins to a minimum of several hundreds of nanometers. Whether or not the air layer collapses (in a single spot nucleation) leading to wetting of the substrate, can be tuned with substrate topography. Introducing micro- and nanoscale defects of various topography, we observe the two different cases, i.e. drop bouncing on the air layer and directed nucleation of liquid-solid contact. Using quantitative dual wavelength reflection interference microscopy we reveal the evolution of the air film, and the influence of substrate defects on localized pressure build-up and film collapse.

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