

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Droplet impact on permeable meshes with yield stress fluids

BRENDAN BLACKWELL, RANDY EWOLDT, Univ of Illinois - Urbana — Yield stress fluids can stick and accumulate where they impact. To understand coating of complex topography, we experimentally study the ability of droplets to accumulate on permeable solid meshes (rigid surfaces with small, evenly spaced openings). When inertial stresses are sufficiently high compared to the yield stress, a drop can pass through a mesh, breaking into smaller fluid particles with varying shapes, sizes, and velocities in the process. In contrast, when inertial stresses are sufficiently low compared to the yield stress, a droplet can stick to the mesh as though it were a solid surface. Drop size, impact velocity, mesh geometry, and rheological material properties are varied. Layers of multiple meshes are also examined, demonstrating a range of behaviors and the ability to coat internal aspects of complex topography. Dimensional analysis is performed to characterize material transmittance as a function of the input parameters.

Brendan Blackwell
Univ of Illinois - Urbana

Date submitted: 01 Aug 2014

Electronic form version 1.4