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Bridging of Liquid Droplets into a Porous Substrate[1] KEVIN MURPHY, JONATHAN BOREYKO, Virginia Tech — When the top of a sessile droplet is brought into contact with an opposing surface, the droplet can transfer to the new surface. Previous reports have characterized the extent and speed of droplet transfer as a function of the surface and droplet properties; however, the two surfaces have always been impermeable. What if the surface receiving the liquid was porous instead? Here, we use side-view high-speed imaging to capture the transfer of liquid from a solid substrate to an opposing porous surface. Variables to consider include the wettability of the donor surface, the porosity and pore size of the receiving surface, and the droplet's volume, viscosity, and surface tension. Generally, the transfer process is split into two regimes: the wetting transition, similar to the wetting of the receiving solid surface in the solid-to-solid transfer, and the wicking transition, where the liquid is pulled into the porous surface. The wetting transition scales with the capillary-inertial velocity for low viscosity fluids and the visco-capillary velocity for viscous fluids, while the wicking transition scales with Darcy's Law.

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