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Wetting in Color: Designing a colorometric indicator for wettability KEVIN RAYMOND, IAN B. BURGESS, NATALIE KOAY, MATHIAS KOLLE, MARKO LONCAR, JOANNA AIZENBERG, Harvard University — Colorimetric litmus tests such as pH paper have enjoyed wide commercial success due to their inexpensive production and exceptional ease of use. While such indicators commonly rely on a specific photochemical response to an analyte, we exploit structural color, derived from coherent scattering from wavelength-scale porosity rather than molecular absorption or luminescence, to create a Wetting-in-Color-Kit (WICK). This inexpensive and highly selective colorimetric indicator for organic liquids employs chemically encoded inverse-opal photonic crystals to translate minute differences in liquids' wettability to macroscopically distinct, easy-to-visualize color patterns. The highly symmetric re-entrant inter-pore geometry imparts a highly specific wetting threshold for liquids. We developed surface modification techniques to generate built-in chemistry gradients within the porous network. These let us tailor the wettability threshold to specific liquids across a continuous range. As wetting is a generic fluidic phenomenon, we envision that WICK could be suitable for applications in authentication or identification of unknown liquids across a broad range of industries.

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