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Coupling the coffee-ring effect to phase separation in drying polymer-nanocrystal deposits ERIK K. HOBBIE, NDSU, JOSEPH B. MILLER, Rice University, AUSTIN C.P. USSELMAN, NDSU, REBECCA J. ANTHONY, UWE R. KORTSHAGEN, UMN, ALEXANDER J. WAGNER, ALAN R. DENTON, NDSU — The coupling between the coffee-ring effect and liquid-liquid phase separation is examined for ternary mixtures of solvent, polymer and colloidal nanocrystal. Using real-space imaging and spectroscopic techniques, we resolve the kinetic morphology of the drying front for varied molecular weight of the polymer. Our results demonstrate that the size of the polymer chain has a significant impact on the nature of the coupling between the two instabilities, and we relate these observations to simulations, measured and predicted binodal curves, and the observed shape of the flow field in the confined region at the contact line. The results inform a blade coating process that we exploit to print homogeneous or periodically patterned microscopic wires of nanocomposite material.

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