Abstract Submitted
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Laser-induced dewetting nanomorphology and nanostructure in immiscible bilayer metal films[1] H. KRISHNA, Dept. of Physics, Washington University in St. Louis, MO, R. SURESHKUMAR, Dept. of Energy, Environmental and Chemical Engineering, Washington University in St. Louis, MO, R. KALYANARAMAN, Dept. of Physics, Washington University in St. Louis, MO — Spatially ordered patterns of nanoparticles result under ns laser-induced dewetting of immiscible bilayer metallic films (Co and Ag) on inert substrates like SiO_2. The morphological pathway during dewetting is different for the two individual metals: occurring through development of bicontinuous structures in the case of Ag and by progression of cellular networks for Co. On the other hand, dewetting in bilayer structures of $Ag/Co/SiO_2$ or $Co/Ag/SiO_2$ shows that the morphology evolution is dictated by the thicker of the two films. Linear stability analysis predicts that the self-organized length scales from the bilayer film dewetting is smaller than a single layer of either metal with the same total thickness. This was also verified experimentally and shows that the metal-metal interfacial dynamics significantly influences bilayer dewetting. Electron microscopy investigations show that the individual nanoparticles consist of Ag and Co in their individual elemental crystal phase. These ns laser dewetting experiments provide novel ways to create multi-metal patterns and nanostructures.

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