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Laser-induced hydrodynamic instability and pattern formation in metallic nanofilms R. SURESHKUMAR, J. TRICE, C. FAVAZZA, R. KALYANARAMAN, Washington University in Saint Louis — Cost effective methodologies for the robust generation of nanoscale patterns in thin films and at interfaces are crucial in photonic, opto-electronic and solar energy harvesting applications. When ultrathin metal films are exposed to a series of short (ns) laser pulses, spontaneous pattern formation results with spatio-temporal scales that depend on the film height and thermo-physical properties of the film/substrate bilayer. Various self-organization mechanisms have been identified, including a dewetting instability due to a competition between surface tension and dispersion forces, and intrinsic and/or extrinsic thermocapillary effects. We will discuss these mechanisms as well as the evolution of surface perturbations which have been explored using experiments, linear stability analysis and nonlinear dynamical simulations (Trice et al. Phys. Rev. B, 75, 235439 (2007); Favazza et al. Appl. Phys. Lett., 91, 043105 (2007); 88, 153118 (2006)).

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