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Pulsed laser induced self-assembly of nanoparticle arrays: Competing liquid phase instabilities J.A. DIEZ, A.G. GONZALEZ, IFAS, Universidad Nac. del Centro de la Prov. de Buenos Aires, Tandil, Argentina, Y. WU, Department of Materials Science and Engineering, University of Tennessee, Knoxville, TN, J.D. FOWLKES, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN, N.A. ROBERTS, P.D. RACK, Department of Materials Science and Engineering, University of Tennessee, Knoxville, TN, L. KONDIC, Dept. of Mathematical Sciences, Center for Applied Mathematics and Statistics, New Jersey Inst. of Technology, Newark, NJ — Thin film copper rings were synthesized on silicon dioxide thin films with various radii, thicknesses and widths and were subsequently liquefied via a nanosecond pulse laser treatment. During the nanoscale liquid lifetimes, the rings experience competing retraction dynamics and thin film and/or Rayleigh-Plateau type of instability, which lead to arrays of ordered nanodroplets. Ultimately, the original geometry dictates the instability pathway, which for narrow rings obeys the Rayleigh-Plateau type of instability, while for wider rings is influenced by the thin film instability. Hydrodynamic simulations describe well the observed time and length scales as well as the observed radial and circumferential instabilities which lead to different nanodroplet ensembles.

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