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Focused Laser Dewetting of Metallic Thin Films JONATHAN SINGER, TIANXING MA, JINGREN WANG, QINGZE ZOU, Rutgers University, PUNNATHAT BORDEENITHIKASEM, JINGBEI LIU, JAN SCHROERS, Yale University — Focused Laser Spike (FLaSk) Annealing generates extreme thermal gradients from a microscale laser spot, which in turn initiate thermocapillary dewetting. Through this controllable mobility and driving force spike, FLaSk has shown the ability to pattern polymer thin films, resulting in direct write of submicron-resolution trench-ridge structures. Due to the lower viscosity and higher surface tension of metallic melts, the gradient-induced dewetting occurs simultaneously with Rayleigh droplet formation, resulting in a trench-ridge-dot feature. When lines are overlapped, the moving instead of removing of metal will result in sub-spot features at a sub-micron scale. Shrinking the line distance coalesces droplets into continuous chains of small islands, reconstructing a trench-ridge structure, which generates visible plasmonic effects. Additionaly, gratings with similar features were generated both on the smooth and roughened films, indicating that to obtain highly uniform final structures does not require defect-free starting materials. Further, continuous samples were generated from an initially discontinuous starting condition, opening the possibility for building conductive pathways.

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