

Abstract Submitted
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Making robust electrowetting processes: dielectric breakdown and satellite droplets GREG RANDALL, BRENT BLUE, General Atomics — For over ten years, charge-related wetting phenomena such as electrowetting or dielectrophoresis have been used to manipulate individual liquid droplets on grids of patterned electrodes. Many proof-of-principle droplet actuations have been shown, however some physics-based problems are complicating this technology's move to industry. These problems include: breakdown of a device's dielectric coating at field strengths lower than anticipated and generation of satellite droplets from the primary droplet's surface. We use atomic layer deposition (ALD) to fabricate high-quality dielectric layers required for robust droplet electrowetting and generate operating plots for several dielectric materials. Using scanning electron microscopy and X-ray spectroscopy, we study damage and ionic penetration into the device's dielectric layer. Using video and current measurements, we examine the physics of satellite droplet generation. We apply these findings to engineer a microfluidic process to mass produce inertial fusion energy targets.

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