

Abstract Submitted
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Impact of Molten Metal Droplets on Textured Surfaces RAJEEV DHIMAN, KRIPA VARANASI, MIT — Most studies of droplet impact on micro/nano-textured surfaces have been done with water droplets. In this work, we studied impingement of molten metal droplets on micro and nanotextured surfaces which is relevant to many industrial applications such as thermal spray coating, spray forming, and solder jet bumping. The phenomenon is complicated by the fact that droplet spreading and freezing occur simultaneously. We used molten tin droplets (2.7 mm diameter) and deposited them on 10 μm square posts surfaces made of silicon by standard photolithography. The impact process was photographed with a high-speed video camera and droplet deformations were analyzed. Surface temperature (25-240° C), impact velocity (0.5-3 m/s), and micropost spacing (5-50 μm) were the key parameters varied. We found that the maximum spreading diameter of the droplet increased with surface temperature and impact velocity, which could be predicted with the help of a simple mathematical model quite well. Droplets splashed through formation of satellite droplets at higher velocities.

Rajeev Dhiman
MIT

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