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Influence of the phase transitions of tin on microjetting and ejecta production OLIVIER DURAND, LAURENT SOULARD, RAPHAL PRAT, LAURENT COLOMBET, CEA de Bruyeres-le-Chatel — We use large scale molecular dynamics (MD) simulations to investigate the influence of the phase transitions of tin on microjetting and ejecta production. These processes occur when a tin crystal containing geometrical free surface defects is shock-loaded. For a few years now, we have been showing the interest of using MD as a complementary approach to the classical one (hydrodynamic) for simulating microjetting. It is indeed at the good scale to capture the physics of fragmentation which occurs at the atomistic scale, and it may also be helpful for analyzing experiments. Until now, the phenomenology of ejection is well understood in the simplest case: when the metal directly melts upon receiving the shock and becomes totally liquid. Here, we go further by integrating in the understanding and the description of the ejection process the presence of non-completely molten regions. We show in particular that when the metal melts on release, solid regions are formed, at the very beginning of the ejection process, as the shockwave interacts with the bottom of the surface defect. This phenomenon causes on late times a strong change of the edge morphology of the ejected sheet of liquid metal; it should also exist at the experimental scale.

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