Laser Assisted Cold Spray Deposition of Niobium for Additive Manufacturing.

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This research investigates the optimization of laser assisted cold spray (LACS) of niobium metal. Cold spray has been successfully developed for solid-state deposition of coatings and for additive repair. Increasingly, cold spray is now being extended to solid-state additive manufacturing. LACS uses in situ laser heating to thermally manipulate the depositing material. LACS has been shown to produce in situ recrystallization during cold spray deposition. There is currently no clear understanding of how the positioning of the laser in relation to the spray plume affects the properties of the material. We are systematically changing the relative position of the laser heating with respect to the spray plume and then monitoring spray characteristics and changes in material microstructure via electron microscopy. A variety of mechanical tests, e.g. tensile, lug shear, and bending, will be conducted to determine the impact of laser heating on the microstructure-mechanical property relationships for niobium.