**Title:**

Recovering and Processing Metal Feedstock Powders for Re-Use in Cold Spray Additive Manufacturing

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**Abstract:**

In Cold Spray Additive Manufacturing, soft metal powders such as aluminum and copper exhibit a high material efficiency, successfully depositing nearly 100% of consumed powder. However, for metal powders with higher hardness and/or low ductile to brittle transition temperatures, the cold spray process may deposit a small fraction of the used powder, the rest lost as it rebounds off the work surface. To recover the un-deposited powder particles for re-use, and reduce costly losses, Inconel 718 powder was collected from a cold spray booth which was operated under an inert atmosphere with its dust collection disabled. The powder was examined for changes in chemical composition, size distribution and morphology, as well as mechanical testing such as nanoindentation and micro compression to determine its viability for re-use in further cold spray processing. Recovered Inconel 718 powder was also heat treated with an annealing step to relieve residual stresses and then re-characterized to measure the effectiveness of processing.