IFPRI BRIEF TEMPLATE

Check One: Project

Descriptive Title	Powder spreadability at high temperatures
Working Title[1]	Powder spreadability at high temperatures
Technical Area[2]	Dry systems, characterization, particle formation
Date	June 25, 2019
Short Description	Investigation of uniformity of thin powder films at various, but typically high temperatures.
Objectives	Understanding how powder properties (i.e mechanical properties, thermal properties, surface properties, morphology) and spreading mechanism (i.e. soft/rigid blade or rotating roller, spreading force, spreading velocity, blade gap) affects the packing density and surface uniformity of thin powder films at various temperatures.
Scope	The quality of powder layers, specifically their packing density and surface uniformity, is a critical factor influencing different industries including the quality of components produced by powder bed additive manufacturing (AM) processes (e.g. selective laser melting, selective laser sintering, electron beam melting and binder jetting). In addition, understanding the effect of temperature on powder flowability is critical as a bulk solid's cohesive strength typically increases with rising temperature. For example, exposure to elevated temperature can permanently change the properties of the powders which can limit the capability to reuse powders. Establishing a correlation between powder properties, spreading parameters and a quality index of thin powder film is crucial to develop a standard powder spreadability metric. To achieve this goal, one needs advanced characterization tools including confocal microscopy to quantify the uniformity of powder layers as well as x-ray microcomputed tomography to characterize powder packing density. Understanding the physics of powder spreadability as it relates to powder mechanical, thermal and chemical properties should be considered.

Recommended Contractors (2 or 3)		
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[1] Title used in meeting agendas and file archives

[2] One or more from the following list: W = wet systems; D = dry systems; F = particle formation; SR = size reduction; M = modeling; SE = systems engineering

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