IFPRI

International Fine Particle
Research Institute

IFPRI Brief Template

Check One: ☒Project ☐Review ☐Collaboration
☐Workshop ☐Other

Descriptive Title	Predictive framework for composite/compact strength from ingredient properties across compaction parameter space.
Working Title[1]	Predictive framework for composite/compact strength
Technical Area[2]	Particle Formation
Date	13-June-2023 [version 1.2~~1~~]
Short Description	Today, industrial practitioners compact and empirically measure the strength without a deeper understanding of the role of the individual ingredient component properties. This often leads to expensive exploration of mixture formulations and increased risk profile in development. Thus, n experimentally focused methodology that can better elucidate the high-stress strength environment during cold composite compaction from *a micromechanical perspective* is needed. To do so, identifying what particle-level properties and behaviors of *single* ingredients that can predict cold compacted strength of mixtures is desired. In other words, how do industrially relevant particles or model systems fuse together to form high strength compacts? We envision that the resultant micromechanical methodology may not only complement and inform emerging computational models [e.g. Kamrin], but also produce a tangible and useful tool that can predict the desired attribute without repeated exploration of mixture formulations.
Objectives	Predictive framework for composite strength from ingredient properties across compaction parameter space.
Scope	• Any multicomponent composite compacted material: ceramic-metal, pharmaceutical, structural, etc. • Any compaction process that reduces porosity irreversibly [e.g roller compaction, tablet press] • Experimentally informed methodology

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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