IFPRI BRIEF TEMPLATE

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

Descriptive Title	Stress concentrations in particulate materials and their inducement for size reduction.
Working Title	Induced stress concentration in milling
Technical Area	Size reduction – SR
Date	June 2025
Short Description	Points of stress concentration in particles, including crystalline, amorphous, and composites thereof, are not well understood, yet of high relevance to size reduction of many functional materials. This proposal seeks a review of stress concentrations in particles (i.e., their structure and mechanisms) by material type including metals, ceramics, minerals (e.g., ores), and organic materials, both crystalline and amorphous.
Objectives	Understand modes of stress concentration and effects relevant to powder processing (e.g., inducement of defects to aid comminution, residual stress occurring in conveying, compaction, etc.).
Scope	1) Materials – describe and define stress concentration (e.g., shear-induced transformation zones, defects on surfaces and/or within crystals, grain boundaries, etc.) and their modes of propagation according to the type of material – e.g., crystalline vs amorphous materials, along a grain boundary, residual stress at a surface, etc. 2) Inducement of stress concentration – methods selected according to relevance for size reduction, dry and/or wet, where wet applies to immersed systems, e.g., slurries and/or partially-saturated systems. Methods can include mechanical pre-stressing, chemical etching, microwave, acoustic, electrical, thermal, etc.

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