



IFPRI BRIEF TEMPLATE

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

Descriptive Title	First principle modelling of mixer agglomeration
Working Title¹	How do particle moisten, stick, dry and agglomerate with background chemical reactions: first principle tool to capture this?
Technical Area²	D,W
Date	19/06/2021
Short Description	Paddle mixer agglomeration is one way of delivering formulated products. In a typical process, powder is first mixed via paddles (rotating shafts and blades), and a liquid (binder) is added to the system via nozzle placed strategically for best dispersion, a chemical reaction between binder and particles lead to moistening to less than wet capillary state. Meantime, collisions happening contact transfer the binders and make the particles “stick” and lead to agglomerated particle in the background. This is a complex phenomenon, currently knowledge around this is largely hit and trial with a particular binder, particular material and set ambient and process conditions. No general predictive tools exist in this area.
Objectives	Initial: Provide an understanding on binder-particle chemistry vs particle mixing physics with some given materials, process and ambient conditions. Intermediate: Explain how change in ambient conditions lead to different agglomerate properties. End: Build a first validated first principle modelling tool on predicting paddle mixing agglomeration: (pass or fail would work as well, given a success criterion like aggro PSD, density) given a particular binder, particle chemical activity, process and ambient conditions.
Scope	Must include: binders with different viscosity, chemical activities. Must include: different mixer process conditions and ambient conditions. Tool must be validated for predicting final Agglomerate PSD, density Dense phase agglomeration Can exclude: lean phase, turbulence. Particle mixing assessment only is not sought after, must have chemistry aspect with binders.

Recommended Contractors (2 or 3)		
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Submitted By:	
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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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