IFPRI Project Brief
Segregation of Cohesive Powders

Significant progress has been made in recent years in modeling size-driven and density-driven segregation in free-flowing granular flows. In contrast, understanding of segregation in cohesive powders is less developed, and characterization and mitigation of segregation in these systems is largely empirical. Cohesion causes adhesion of small particles to large, agglomeration of small particles, and larger scale changes to the flow dynamics of the powder. Consequently, the nature of particle segregation is also different. In the proposed research project, we aim to expand the design space for predicting segregation from non-cohesive mm-sized particles to include cohesive particles, with an emphasis on mixtures of large and fine particles where the fine particles are substantially smaller than the large particles. More specifically:

- Expand/develop segregation models to account for cohesion in dense particle flows
- Determine parameters that are key to predicting the character of the segregation of fine particles from much larger particles.
- Evaluate the effect of the concentration of fines and flow parameters on segregation with emphasis on understanding the scalability of the cohesive effects to larger systems.

The project should involve both modeling/simulation and experimental work and not be limited solely to DEM simulation or continuum modeling.

Fluidized particle systems and particle elutriation are out of scope.