IFPRI

International Fine Particle Research Institute

Research Project Brief

Aeration and Deaeration of Geldart Type C Powders

The International Fine Particle Research Institute (IFPRI) wishes to fund a research project on aeration and deaeration of Geldart Type C powders that occurs in bulk handling operations such as packaging. Controlled fluidization (i.e., fluidized bed operation or pneumatic conveying) is out of scope of this project.

Geldart Type C powders – fine and cohesive – exhibit unpredictable packaging behavior, for example highly variable packing rates and densities. This is especially true at large-scale production rates, > 100 kg/hour. Different powders behave qualitatively and quantitatively differently, and it is difficult to characterize them in a way that is predictive of their aeration and deaeration behavior. This project should focus on this problem: development of reliable characterization methods for Group C powders that enable prediction of packaging behavior (rate, density, variability) when the material is aerated during handling processes. The work should investigate the effects of single particle properties and particle interactions such as size distribution, surface roughness, particle cohesivity, and electrostatics. Ideally, the proposal should include a representative validation system.

In the packaging operations of interest, the powder is loaded into (semi) bulk containers (flexible or hard walled), 5-20 kg bags, or 1–4-liter bottles. Dosing into small packages (die filling, encapsulation) is out of scope, as this is the subject of other IFPRI projects. Uncontrolled aeration takes place during flow into the package, for example gravity flow in a chute or in a high-speed screw conveyer. Deaeration in the package is time-dependent and often is influenced by compaction (due to the weight of powder in a package or by stacking of multiple packages). Vibration is sometimes used to increase bulk density.