IFPRI Research Project Brief

Model-Assisted Design of Granular Products

The International Fine Particle Research Institute (IFPRI) wishes to fund a project to develop a framework for model-assisted design of structured granular products. In a wide spectrum of industries, from commodities to consumer products, fine chemicals to pharmaceuticals there is a strong push towards efficient development of granular products with prespecified functional properties. Instead of relying on repeating cycles of small-scale formulation experiments and functional testing, efficient product design requires development of linked models of the formulation process and product performance. For granular products, these models are necessarily multi-dimensional in particle properties, because product performance depends on more than simply particle size. Process and product models must include multiple properties, for example porosity, pore size, distribution of components (e.g. binder, active ingredients), etc.

The objective of this project is to develop multi-dimensional process models of binder agglomeration that have as their output the appropriate particle properties (likely distributed) that are linked to associated product models to predict product performance. We constrain the project scope to high-shear and/or fluid bed granulation, however the choice of formulation(s) and modeling approach(es) are open. The project has the following components:

1. Identify the best modelling methodologies for high-shear and fluid-bed granulation processes and granulated product modelling
2. Identify the best modelling framework
3. Identify the best solution strategy
4. Build models & validate against experiments

This should be done in the context that the modeling framework and the specific models be deployable to industry.