



IFPRI Project Abstract

Model Assisted Design of Granular Products: Linking Process and Product Models for Wet Granulation

Rachel Smith

The University of Sheffield

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Project Objective:

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. The project scope is constrained to high-shear and/or fluid bed granulation, however the choice of formulation(s) and modeling approach(es) are open.

Approach:

The aim of this research project is to develop a modeling framework for product performance driven process design which is deployable to industry, and demonstrate the potential of this strategy with two case studies: fluidised bed spray granulation and high shear granulation. This will involve the development and linking of population balance models for fluidised bed and high shear granulation with a mechanistically-based product model.

Recent Results:

Since the start of the project last year, the following key progress has been made:

- PhD student Peyman Mostafei has been recruited, and started his PhD in November 2019.
 - Significant progress has been made in reviewing the literature.
 - A population balance approach has been chosen to develop a dissolution/disintegration product model. This model will act as the case study product model for the project.
 - Key mechanisms involved in the dissolution/disintegration process have been identified.
 - Progress has been made towards identifying and modifying mechanistic expressions for hydration, swelling and dissolution.
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Next Steps:

In the next year, focus will be placed on further developing expressions for the product model. In addition to implementing, modifying and developing expressions for each of the mechanisms, key decisions will be made about the inclusion/exclusion of mechanisms from the model, and the development of complementary experimental systems for model validation. We also plan to complete the literature survey. We will initiate both process model modification and overall framework development.
