



Research Project Brief

Spray-drying Kinetics and Particle Morphology

The International Fine Particle Research Institute (IFPRI) wishes to fund a research project on the relationship between spray-drying kinetics and particle morphology. While this has been a topic of study for many years, it is still not possible to transfer a spray-drying process from the laboratory to manufacturing and predict with confidence if a dry powder will be formed (or what conditions are required to achieve this) or how particle morphology changes with scale and process conditions. What is missing is a robust, quantitative, mechanistic model for single drop drying that couples the drying kinetics with morphology development. This is the objective of this project: to understand the fundamental mechanisms leading to obtaining a dry powder and ultimately development of a numeric model, validated with experiments, to predict product morphology from inlet feed properties (e.g. rheology, surface tension, composition, glass transition temperature) and the local drying kinetics. To be relevant to IFPRI members, the project should consider temperatures above and below the solvent boiling point, droplet size below 200 microns, and drying times less than 10 seconds. To narrow the scope, only aqueous systems (solutions or slurries) should be considered, however the solid can be organic and/or inorganic.