

An Indian-Australian research partnership

Project Title:

Modelling of Oil Adsorption in porous inorganic salt prills

Project Number

IMURA0220



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Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. Advanced computational engineering, simulation and manufacture
2. **Infrastructure Engineering**
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

The research problem

The aim of this project is to develop molecular models which increase understanding of oil phase adsorption in inorganic salt prills, an understanding of whether / how this varies with oil properties, a basis for the design of the "ideal" prill for high adsorption, and an understanding of whether the ideal prill parameters vary with oil type.

Suggested Project Steps

- Review of capillary growth, formation model literature.
- Development of a model for capillary formation in prills, either predicting pore size and void fraction, or mathematically describing this if the prediction is not possible.
- Development of a model for oil wetting firstly in ideal capillaries of varying size, and then in a network of capillaries (as per prills). Comparison with data from experimental studies.
- Extending the model in Step 3 to emulsions. Comparison with data from experimental studies.
- Consider the integration of the data to other industrial prill wetting modelling codes.

Project aims

To develop mathematical models for fuel adsorption into voids and capillaries of inorganic salt prills, and integrate with numerical prill codes.

Expected outcomes

Highlight the expected outcomes of the project

Expected outcomes for the project include validated molecular models of the factors influencing the adsorption of mineral and vegetable oils into porous inorganic prills, initially for idealised single capillaries, and then for capillary networks.

Capabilities and Degrees Required

Essential: Masters in Chemical Engineering

Desirable: Knowledge/Experience with concepts of Adsorption, interfacial science,

Desirable: Good mathematical background,

Desirable: Fluid mechanics based simulations, free-surface methods, knowledge of Fluent, network topology models, multi-physics modelling.