

An Indian-Australian research partnership

Project Title:

Modelling Investigations of Surface Forces in
Water-in-Oil Emulsion Contact with Minerals

Project Number

IMURA0227



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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

There are many practical industrial applications where water in oil emulsions come into contact with minerals and other solids, including steel and various plastics. This project investigates the fundamental surface forces governing the behaviour of the emulsion when interacting with the surfaces. Through a study of the surface force interactions between the different phases, the project aims to study parameters such as: adhesive strength of the emulsion, rheological behavior of the emulsion under shear by the solid, and surface impregnation.

Project aims

To investigate molecular modeling of the surface properties of various solid surfaces, and the influence on adhesive strength of the emulsion, rheological behavior of the emulsion under shear by the solid, and surface impregnation..

Expected outcomes

Highlight the expected outcomes of the project

The expected outcomes of the project are validated molecular models describing the factors influencing the adhesion and rheological behavior of emulsions in static or shearing contact with different solid substrates

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

Essential: Masters or Degree in Maths Sciences, Chemistry, Chemical Engineering, or Mechanical Engineering

Essential: Experience in molecular modelling of surface chemistry and/or surface engineering

Desirable: Experience in colloids, physical chemistry, experimental colloids stability

Desirable: Experience in rheology, tribology,

Desirable: Experience in mining engineering, rock response behaviour.