

An Indian-Australian research partnership

Project Title: **Development of hydrophobic / Hydrophilic Coatings by Sol-gel route using fatty acids modified nano materials.**

Project Number **IMURA0198**

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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

Define the problem

Retention of water on metal surface causes corrosion of substrate. By surface modification of metal or by coating the metal with hydrophobic or hydrophilic material will reduce the amount of surface area coming in contact with water and hence improve the corrosion resistance. Such coatings increase the surface roughness or decrease the surface energy of the surface and reduce the adhesion of water and contaminating particles to the surface.

Project aims

Define the aims of the project

The aim of the project is to develop a hydrophobic /hydrophilic coating for various industrial applications which can be achieved by sol-gel route by incorporation of various nano-oxides such as nano-ZnO, nano Al₂O₃, nano SiO₂ etc which are hydrophobically modified using various long chain fatty acid precursors like stearic acid, oleic acid etc to improve the compatibility b/w inorganic nanoparticles and organic matrix by reducing agglomeration.

Expected outcomes

Highlight the expected outcomes of the project

Expected outcomes

- (1) Reduced agglomeration of nano-particles in sol-gel matrix
- (2) Coatings are expected to have high degree of hydrophobicity with water contact angle of around 130°
- (3) Coatings are expected to have excellent corrosion resistance and very good U.V. and mechanical properties

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

There are various industrial, biological, chemical and electronic applications of hydrophobic sol-gel coatings. They are used as self cleaning or anti-graffiti coatings nowadays. They can be applied on metal substrates like M.S. , Aluminium alloys, and also on glass and acrylics. Hydrophobic coatings are becoming increasingly popular in numerous applications such as windows, T.V. screens, DVD disks, cooking utensils, clothing and medical instruments.