IITB-Monash Research Academy

An Indian-Australian research partnership

Indian Institute of Technology Bombay | MONASH University

Project Title:	**Investigation of droplet break-up in two phase microfluidic systems**	
Project Number	**IMURA0465** *(will be inserted by The Academy)*	
Monash Main Supervisor (Name, Email Id, Phone)	Adrian Neild, Associate Professor, adrian.neild@monash.edu	*Full name, Email*
Monash Co-supervisor(s) (Name, Email Id, Phone)		
Monash Department:	Mechanical and Aerospace Engineering	
Monash ADRT (Name,Email)		*Full name, email*
IITB Main Supervisor (Name, Email Id, Phone)	Rajneesh Bhardwaj, Assistant Prof, Mechanical Engg	*Full name, Email*
IITB Co-supervisor(s) (Name, Email Id, Phone)		
IITB Department:	Mechanical Engineering	

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

We have a unique technology for actively breaking up water droplets in oil. By actuation of a force on the interface between the fluids, using acoustic waves, we have shown that the water droplets can be selectively segmented. What is required to optimise this approach, and enable would could become a key technology for on-chip biochemistry, is a theoretical understanding of the interface dynamics – this project aims to develop this through simulation and experimentation.

Project aims

To understand the dynamics of a fluid/fluid interface under transient forcing.

Expected outcomes

A design for the optimum channel geometry and force profile such that highly accurate droplet splitting can be achieved, and a demonstration system achieving this.

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

The project will address theme 1. It will involve simulation, and apply this to experimental investigation conducted at Monash.

Capabilities and Degrees Required

A knowledge of fluid mechanics and some experience in system modelling.