IITB-Monash Research Academy

Indian Institute of Technology Bombay | MONASH University

An Indian-Australian research partnership

Project Title:	***Generating "live" gene expression tools for use in algal molecular manipulation***	
Project Number	**IMURA0304**	
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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

Project objectives and Strategy

The current knowledge and available technology tools in biotechnology area are helping scientists all over the world to improve biological organisms towards a much faster and efficient improvement for the intended use. Available genomic tools like high throughput sequencing can create an enriched source of gene pool to use for specific trait of interest. Use of algae as a biomass source for synthesizing molecules of interest especially biofuels has been tried for quite some time now. Available gene pools can tremendously help in using molecular tools towards this objective. But one of the bottle necks for any genetic engineering strategies is the availability of appropriate gene expression tools, mainly promoters to express the genes at the right time, right level and at the right places. These promoters could be obtained from the native algal species from the genes which expresses in the desired fashion. But one of the challenges of isolating promoters from laboratory grown cultures could be the translatability of the gene expression conditions in the open environment. To handle this problem, the project will focus on isolating "live" promoters. Algae sample would be collected at different conditions (depending on the interest of regulation points, like growth stages, sunlight intensity, heat etc), frozen quickly and then the transcriptomes will be analyzed. Studies on this transcriptomes should provide sufficient clues to isolate promoters for the genes of interested regulations.

Expected outcomes

- Identify and define critical expression needs and the conditions thereby for Biotechnological manipulation of algae.
- Analyse transcriptomes in specific and desired conditions.
- Further screening the regulated genes using Bioinformatics tools.

Identify and isolate upstream sequences of the identified regulated genes.