

**CENTRE OF EXCELLENCE IN PROCESS INTENSIFICATION**

**ACTION PLAN**

**INSTITUTE OF CHEMICAL TECHNOLOGY  
MATUNGA, MUMBAI 400 019**

## COMMENT FROM EXPERT COMMITTEE

**Name of Institutions:** Institute of Chemical Technology, Mumbai

**Name of CoE:** Process Intensification for process industries

**Date of Review Meeting:** 28<sup>th</sup> May 2014

**Name of Review Committee members:**

1. Prof. Devang V Khakhar, Director, IIT Bombay and
2. Prof. Prashanta Kumar Das, IIT Kharagpur

The summary of the observations of the Review Committee members are as below:

- **Comments:**
  - The Centre has clearly specified the overall objectives of the project
  - The objectives of 13 sub-projects have also been elaborated clearly
  - The proposed methodology has been explained
  - In all the cases the reactor will be designed, fabricated and its performance will be studied through experiments
- **Achievements:**
  - Based on thorough literature survey, work plan has been proposed
  - Excellent quality of Research : Some chemicals/catalyst synthesized and promising results obtained in several projects
  - The work plan and grouping of projects is systematic
- **Key Issues /Concerns:**
  - Some theoretical modelling is required to understand / generalise the principle of intensification
- **Recommendations:**
  - More characterization and experimentation with surfactants are necessary
  - Some generalization of results for similar reactors (like ultrasonic or micro wave) should be made

**Action Plan:**

As suggested by the committee, Theoretical modeling aspects have been included in the research projects wherever possible to understand / generalise the principle of intensification. As per the recommendations the PI working with similar reactors (like ultrasonic and microwave etc.) will collaborate to generalize the results. The modeling components in various research projects is tabulated below.

| Sr. No. | Project Name  | Theoretical Modeling  |
|---------|---|---|
| 1       | Design aspects of two-opposed-jet micro-extractor : Experimental and Computational Fluid Dynamics                 | 1. CFD analysis of flow patterns and energy dissipation rates<br>2. Development of scale-up rules |
| 2       | Extraction of Natural Ingredients Using Novel Extraction Techniques   |   |
| 3       | Microwave Assisted/enzyme mediate extraction/Synthesis of Bioactive colorants lutein/lycopene/indigoid/azulenes   |   |
| 4       | Enzymatic Process Intensification for the manufacture of structure lipids to enhance the yield                    | Mathematical modeling of reaction kinetics and parameter optimization                             |
| 5       | Process Intensification of Crystallization Using Sonochemical Reactors  | Optimization of process parameters to minimize the energy consumption                             |
| 6       | Process development of Nanostructure Metal oxides by sonochemical techniques                                      | Reaction kinetics and catalyst effectiveness factor   |
| 7       | Microwave, Ultrasound, Solar energy assisted preparation of Metal Oxide Nanomaterials                             |   |
| 8       | Microwave assisted halogenations reactions using flow reactor   | Mathematical modelling for design and scale up  |
| 9       | Dyeing of Polyester & it's blend using Nano-emulsions   |   |
| 10      | Process intensification through catalytic process- Microwave Assisted Bifunctional Catalysis for Tandem Reactions |   |
| 11      | Development of Ecofriendly And Cost Effective Extraction Technologies Using Supercritical CO <sub>2</sub>         |   |
| 12      | Microwave Assisted Process Intensification : Expt investigation for vapour phase catalytic reaction               | 1. Reaction kinetics and parameter optimization<br>2. Reactor Design and scale-up                 |
| 13      | Sorption-Enhanced Reforming process   |   |

