

## CARBON RESEARCH AND ENGINEERING LAB

### Faculty Details:



#### **Dr LIMA ROSE MIRANDA**

Professor

Department of Chemical Engineering

A.C.Tech Campus, Anna University

Tamil Nadu, India - 600025.

**Ph: 044 2235 9130**

**E-Mail: limamiranda@gmail.annauniv.edu**

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### *Carbon Research Lab aims to:*

- Work towards revolutionary research and innovation
- Adopt new trends in Green Technology and Energy Recovery
- Water & Wastewater technologies
- Facilitate access for innovative research

### **Resources & Facilities**

- **Wet Lab (All processes listed are available in lab scale)**
  - Plastic pyrolysis unit
  - Adsorption Columns
  - Photocatalytic reactor
  - Fluidized bed reactor

Specifically, CRE Lab focuses on industry effluent treatment by adsorption, photocatalytic and plastic pyrolysis.

- Adsorption process using activated carbon from biomass waste.
  - a. Synthesis of activated carbon from indigenous sources.
  - b. Characterization and physio-chemical properties of activated carbon.
  - c. Performance of industrial effluent treatment using activated carbon.
- Conventional Pyrolysis of plastic waste using synthesized catalyst from agro-waste.
  - a. Study of microwave pyrolysis of mixed plastic waste.
  - b. Preparation of microwave absorbent from biomass waste.
  - c. Calculation of energy balance and energy efficiency.
- Effluent treatment and degradation of organic compounds by photocatalytic process using synthesized photocatalyst.
  - a. Synthesis of photocatalysts that accelerates photocatalytic reaction under visible region.
  - b. Elemental composition, structure, surface area and optical properties of synthesized photocatalyst are studied.

- c. Degradation studies of organic pollutants using photocatalytic reactor.
  - Study of fluidization characteristics in inclined fluidized bed and hydrodynamics and mass transfer studies involving three-phases circulation fluidized beds.
    - a. Flow characteristics of liquid solid in inclined fluidized bed are studied.
    - b. Minimum fluidization velocity is determined theoretically and experimentally.
    - c. Development of mathematical model for mixing of three solid in gas-solid fluidized bed.
  - Modeling of reactors and Design parameters for pilot plant scale-up.
    - a. To diagnose problems of reactors in process.
    - b. Predict conversion in existing reactors in batch and continuous process for new reactions.
  - Study of wastewater treatment using membrane separation technologies
    - a. Development of new polymeric membranes for purification of wastewater.
    - b. Diagnosis of structure, porosity and surface topography of polymeric membranes.
    - c. Rejection and Performance of polymeric membranes.
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### **Accomplishment:**

#### **(a) Research work has been carried out in different areas for the award of Doctoral and Masters Degree**

##### **1. Pyrolysis of Plastic waste**

- Microwave Assisted pyrolysis of plastic waste (Diesel, Gasoline like fuel fractions)
- Catalytic Pyrolysis (catalyst from Waste-Rice husk, Activated carbon from Coconut sheath)

##### **2. Textile dye effluent Treatment by Activated Carbon**

- Activated Carbon (from Agave sisalana fibre (Sisal fiber) and Puninga granatum Peel (Pomegranate Peel) etc using Batch and fluidized bed reactors)

##### **3. Nanocatalyst synthesis for organic pollutant degradation**

- Synthesis of nanophotocatalyst
- Photocatalytic degradation of organic

##### **4. Fluidization studies in Inclined Column**

- Modelling of fluidized bed to move solids in a fluid like fashion.

#### **(b) Research work has been published in different journals**

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**List of Major Equipments:**

<b>S. No.</b>	<b>Name of the equipment</b>
1.	Pyrolysis Reactor
2.	High temperature muffle Furnace
3.	Ultra Cryostat
4.	Temperature controlled orbital shaker
5.	Photo catalytic reactor
6.	Sono chemical reactor
7.	Gas solid fluidized bed column
8.	Rotary kiln carboniser
9.	High temperature fluidized bed reactor
10.	Microwave pyrolyzer
11.	Inclined Fluidized Bed

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**List of Research Scholars:**

<b>S. No.</b>	<b>Name</b>	<b>Thesis Title</b>	<b>Year of passing/Status</b>
1.	Mahesh Ganesapillai	Microwave drying of nonconductive material -plaster of paris	2010
2.	M.Helen Kalavathy	Studies on the removal of heavy metal from aqueous solutions and effluents.	2011
3.	T.Senthilkumar	Adsorption of textile dye effluent using activated carbon obtained from biomass	2014
4.	Padmini.E	Preparation and characterization of doped semiconductor catalyst and kinetics of photo degradation of organic pollutants under visible light	2015
5.	Shruthi Sunderrajan	Studies on the removal of heavy metal from aqueous solutions and effluents.	2019
6.	R.Prathiba	Degradation studies of plastic wastes using Thermal, Catalytic and Microwave Processes	2021
7.	Selva Ilavarasi P	Production and Optimization of Esters from Crude Unsaturated Oils	Ongoing

6	P.Anand Kumar	Hydrodynamics of Multiphase flow in a column of different orientation	Ongoing
7	R.Lavanya	Pollution abatement by adsorption using biomass	Ongoing
8	N.Premalatha	Photocatalytic degradation of organic pollutants	Ongoing

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