INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : Murchana Changmai

Roll Number : 146107004

Programme of Study : Ph.D.

Thesis Title: Fabrication of fly ash based ceramic membrane for tomato juice clarification and water treatment

Name of Thesis Supervisor(s) : Prof. Mihir K. Purkait

Thesis Submitted to the Department/ Center : Chemical Engineering

Date of completion of Thesis Viva-Voce Exam : 01/03/2019

Key words for description of Thesis Work : Membrane; Separation; Water treatment; Electrocoagulation; Adsorption

SHORT ABSTRACT

A rapid growth in the field of industries and academia has resulted in the immense development and amplification of the membrane technology market. Over the past few decades a rapid transformation has been witnessed with the development of new methods and technologies related to membranes science which cover a wide range of applications such as microfiltration, ultrafiltration, reverse osmosis, gas separations, artificial human organs to name a few. The scientific and engineering disciplines such as electro chemistry, physical chemistry, polymer chemistry and chemical engineering play a major role in this perspective. Thus membrane separation acts as a bridge connecting the varied applications with the respective disciplines. Microfiltration and ultrafiltration with the progress of time have emerged as good replacements for previously existing separation techniques such as a gravity filtration and clarification systems. The main advantages of membrane systems is that they occupy very less space with better operational durability. Recent research have pointed out the advantages of ceramic membrane over polymeric membranes over a wide range of applications which include properties such as stability at high operating temperatures and pressures, good chemical stability, relatively narrow pore size distribution and a higher porosity, higher hydrophilicity with high fluxes at very low pressures and a good mechanical stability, longer working life and impressive defouling properties. However, there still remains certain limitations associated with ceramic

membranes which still needs to be acted upon. Large scale fabrications face a tremendous issue with the production of such functional membrane due to high fabrication costs along with the existence of a complicated fabrication process. Thus, it is of utmost necessity to come up with a simple and easily available fabrication technique for ceramic membranes which can be utilized on a large scale. The present work discusses a simple and easy method for the preparation of ceramic membrane suitable mainly for microfiltration applications. The prepared ceramic membrane was modified using a temperature responsive polymer to prepare a specially surface modified ceramic membrane Various applications carried out in the present work include microfiltration of tomato juice, utilization of carrot water from microfiltration process into a novel adsorbent for the treatment of Co (II) contaminated water, utilization of a composite temperature responsive ceramic membrane for BSA rejection, treatment of fluoride water, treatment of steel industry wastewater, treatment of drilling wastewater.