



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS



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Programme of Study : Ph.D.

Thesis Title: **Studies on Ceramic Membrane, Sonication and Hybrid Processes for the Clarification of Vegetable Juices and Extracts**

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SHORT ABSTRACT

Contemporary efforts to develop nutritionally rich food products emphasize upon extraction of phytochemicals, antioxidants and soluble proteins from vegetable juices and extracts. Targeting cost effective processing in this area of research, the PhD thesis devotes towards the ceramic membrane based microfiltration process (MF) development and optimization, ultrasound-assisted exaction (UAE) process optimization and optimization of combined MF-UAE process for the cost effective processing of bottle gourd juice and bitter gourd extracts. The ceramic membranes for the microfiltration process have been prepared using saw dust as a pore former and kaolin as a chief inorganic precursor. Mixed model design (MMD) based response surface methodology (RSM) was followed to yield ceramic membranes through a systematic variation in saw dust composition, particle size and precursor concentrations. Thereby, membranes with wider average pore size (0.09 – 1.39 μm) and porosity (14.08 – 30.43 %) were obtained. Among various membranes, membranes with an average pore size of 0.45, 0.75 and 1 μm were chosen for the microfiltration experiments throughout the thesis. Further, economic competence of bottle gourd juice MF process was also targeted for various feed systems such as fresh, filtered and centrifuged juice systems. The findings indicate that the best permeate sample with high nutrient and clarity and low color characteristics were achieved using 0.75 μm membrane, filtered juice and 137.9 kPa trans-membrane pressure. The bitter gourd juice extraction process was optimized using RSM approach and both normal and pulse mode of UAE process operations. Finally, hybrid MF-UAE process performance was evaluated for the extract being obtained with optimal UAE process conditions. The hybrid process indicated best membrane performance for 0.75 μm membrane and 137.9 kPa applied pressure case.

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