



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Crystallization, Separation, Extraction, and Quantification on a Microfluidic Platform

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Thesis Submitted to the Department/ Center : Chemical Engineering

Date of completion of Thesis Viva-Voce Exam : 28/10/2022

Key words for description of Thesis Work : Chiral resolution, Biosensors, Portable Devices, Carbon dots, Hemoglobin, electric field, interfacial instability, μ -reactor, μ -crystallizer, Separation, Extraction.

SHORT ABSTRACT

The primary focus of the thesis is to explore, design and develop a microfluidic platform for the efficient resolution of enantiomers, surfactant separation, dye extraction, and Hemoglobin quantification. A flexible μ -reactor and a μ -crystallizer are fabricated for the continuous production of diastereomer salt crystals from racemic α -phenylethylamine (I) where optically active L-(+)-tartaric acid (II) is used as a resolving agent. Moreover, a Y-shape microchannel was fabricated and thin copper sheet electrodes were placed across the channel to separate both anionic and cationic surfactant simultaneously from its mixture under the influence of ultra-low electric voltage. It was found that separation efficiency solely depends on the residence time of the fluid. Furthermore, liquid-liquid extraction was investigated to transfer a component transfer from one liquid phase to another liquid phase under the presence of an applied external electric field in a microchannel. With this, we explored interfacial instability in the presence of an external electric field inside the microchannel for the extraction of methylene blue dye from the aqueous phase using N-amyl alcohol. Additionally, we attempt to develop a simple, low-cost, easy to use point of care (PoC) device based on the spectrophotometric principle for the quantification of Hemoglobin (Hb) on a microfluidic platform. The specific interactions of Methylene Blue (MB) with Hb in the presence of CDs show a unique characteristic optical feature, and the same is exploited for the quantitative estimation of Hb.