

# PREFACE

Microemulsions are macroscopically homogeneous mixtures of oil, water, surfactant and/or cosurfactant, whereas in the microscopic level it consists of individual domains of oil and water separated by a monolayer of surfactant and/or cosurfactant. The microheterogeneity of such dispersion with unique physicochemical properties viz. spontaneous formation, clear appearance, thermodynamical stability, ultra-low interfacial tension, low viscosity, large interfacial area, high solubilization capacity for both hydrophilic and lipophilic compounds induce drastic changes in the reagent concentrations, and this can be specifically used for tuning the reaction rates.

Generating discrete droplets in an immiscible continuous (carrier) phase allows reactions to be compartmentalized into femtolitre to nanolitre volumes. In essence, each droplet reactor is analogous to the traditional chemist's flask, with the added advantages of reduced reagent consumption, rapid mixing, automated handling, and continuous processing. Building on advances in continuous flow chemistry, droplet-based micro fluidics has been used to conduct a variety of organic reactions. This platform provides opportunities for handling precious reagents that are not possible with conventional synthetic techniques and has been used to screen reaction conditions using microgram amounts of starting material.

Moreover, microemulsion can induce regioselectivity in organic reactions changing the product composition compared with the products obtained in a microhomogeneous solution. The induced regioselectivity is believed to be due to the interface acting as a template for reactants having one more polar and one less polar end.

In view of these, this dissertation depicts the formation, characterizations and mainly the prospective applications of microemulsions as reaction media in 'synthetic organic chemistry and the most possible reaction location/site in such microheterogeneous media. Hence, such a highly exciting field can be expected to flourish greatly in the coming years to meet the high standards demanded by the organic synthetic chemist.