Novel Synergistic Biosurfactant Systems for Greener Biofuels

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Increasing requirements for environmental protection and escalating demands from the general public have made "going green" inevitable for all industries. In this regard, biosurfactants play a duel role. They are indeed biodegradable; in addition, when used alone or under synergistic conditions with conventional surface active agents, they can be employed to reduce dosage requirements and thus the resulting carbon foot print. In our work, we are exploring the next generation of greener and more efficient surface-active agents in industrial applications such as enhanced oil recovery as well as oil transport and remediation. Our overall aim is to deliver a framework of knowledge pertaining to colloidal and nanostructural properties of selected "Greener" surfactant systems. More importantly, when mixed with other surfactants they exhibit synergistic/antagonistic behavior, which can be used to tune the performance of new systems. Furthermore, challenges facing bio-fuel synthesis through inorganic catalysis are also being explored. By using surfactant mediated nano-emulsion containers, aggregation of MoS_2 catalysis particles is limited to a maximum of few nanometers. This approach of using nano-emulsion reactors for MoS_2 catalyzed synthetic gas reaction is hypothesized to achieve desirable reaction pathways at high temperature and high pressure conditions.