

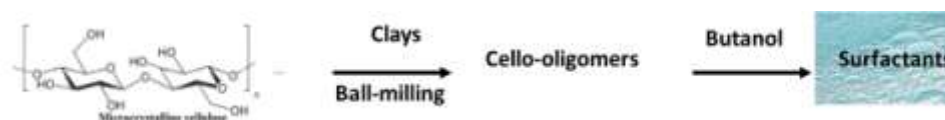
Research topic for a fellowship in IC2MP in the framework of the master
IMACS

From February to June 2016

Title : Glycosylation of cellulose by mecano-catalysis to produce surfactants

Context

With the depletion of fossil reserves, a high interest is devoted to the utilization of renewable carbon. Surfactants are mostly synthesized from fossil carbon (70% of the world production of surfactants). In the future, the final aim is to produce 100% of surfactants from renewable carbon. Cellulose is a promising renewable source of carbon for this application. Cellulose is a polymer of glucose linked by β -1,4-glycosidic bonds contained in lignocellulosic biomass. Cellulose is a cristallized polymer with inter- and intramolecular hydrogen bonds leading to a low chemical reactivity.



Objectives

The objectives of this fellowship is the reaction of cellulose with butanol to produce surfactant. Prior to this reaction, cellulose, a recalcitrant polymer has to be treated. A pre-treatment known in the literature is ball-milling which leads to the decrystallization of cellulose. The main aim of this study is the use of clays materials a catalyst in ball-milled reactor to slightly depolymerize cellulose to produce cello-oligomers. Hence, clays will be used owing to their delamination properties and to their acid surface. In a first step, clays will be selected and characterized (structural properties, acidity...) by various analytical technics. The characterizations will be carried out before and after ball-milling treatment. In a second step selected clays will be used in the pre-treatment of cellulose by ball-milling and a glycosylation reaction in butanol will be then performed.