

THE EFFECT OF O/W MICROEMULSION PRETREATMENT ON BIOMASS CONVERSION

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Abstract

New resources have been considered to replace nonrenewable feedstock for the production of liquid fuels. Woody biomass, as the most abundant resource available, is an alternative of choice. However, high sugar yields in bioconversion are needed to realize its utilization. Our efforts to pursue feasible and environmentally friendly bioconversion, include the use of microemulsions as a green biomass pretreatment. Microemulsions are thermodynamically stable, one-phase system that consists of three main components, namely, an organic and an aqueous phase and a surface-active agent. An appropriate component mixture is needed to design microemulsions with desirable properties. Among the surfactants, the non-ionics are the most effective because their hydrophobic interactions with lignocellulosic substrate. We found that O/W microemulsions have the ability to penetrate the complex structure of wood at atmospheric pressure and low temperature. Appropriate formulation and composition of microemulsions allow a high fermentable sugar yield after enzymatic saccharification of hardwood species. The characterization of the solid residues, including chemical composition and physicochemical properties such as crystallinity and thermal degradation, was carried out in order to evaluate the effect of microemulsion pretreatment. The application of microemulsions allowed the substrate to swell, which is essential in the initial stage of the enzymatic hydrolysis process. The main observations and impact of this newly proposed technology will be presented.