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Valorization of sugarcane bagasse as an emulsifier in O/W emulsion by Hydrothermal Liquefaction (HTL) pre-treatment

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Sugarcane bagasse, the fibrous residue from raw sugar production mostly consists of cellulose, hemicellulose and lignin. It is a potential source of carbohydrates if valorized in the food industry rather than burning for energy production. For pre-treatments, HTL at subcritical conditions (<374°C and <22 MPa) is favored because chemical and biological treatments produce undesirable by-products, are expensive and time-consuming. As natural emulsifiers, the oligosaccharides liquefied by HTL treatment can be suitable candidates to replace synthetic surfactants, provided that they have amphiphilic ability to stabilize emulsions. The objective was to formulate O/W emulsions stabilized by liquefied oligosaccharides from HTL. In the HTL reactor, 3% (w/w) grinded bagasse (50 µm) was treated at 220°C, 30 min and 1 MPa. The liquefied portion was vacuum filtrated and freeze-dried for 48 h, before redissolving it in 5 mM Phosphate buffer solution (0.5-4 wt%) as continuous phase. Polytron (10,000 rpm, 5 min) and high-pressure homogenization (100 MPa, 4 passes) achieved O/W emulsions with soybean oil before storage at 25°C. By increasing emulsifier concentration the interfacial tension decreased from 26 mN/m to 18 mN/m. Therefore, the HTL liquefied oligosaccharides can reduce the interfacial tension between oil and water, so that reducing their tendency to separate. Droplet sizes showed that O/W emulsions with 3% emulsifier had better stability with d_{3,2} diameter of 272 nm after 6 days. Thus O/W emulsion with HTL treated bagasse was successfully prepared and showed stability, proving it has good emulsifying capability.

Biography

Sekove Vodo is currently a PhD student at the University of Tsukuba, Tsukuba, Japan. Previously he worked in a raw sugar factory before proceeding to pursue his Masters at University of Tsukuba. His current research focus is the valorization of sugarcane bagasse especially with pre-treatment and its application in the food industry.

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