

Immobilization of *saccharomyces cerevisiae* in rice hulls for ethanol production

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Abstrak

The whole cell immobilization in ethanol fermentation can be done by using natural carriers or through synthetic carriers. All of these methods have the same purpose of retaining high cell concentrations within a certain defined region of space which leads to higher ethanol productivity. Lignocellulosic plant substance represents one of highly potential sources in ethanol production. Some studies have found that cellulosic substances can also be used as a natural carrier in cell immobilization by re-circulating pre-culture medium into a reactor. In this experiment, rice hulls without any treatment were used to immobilize *Saccharomyces cerevisiae* through semi solid state incubation combined with re-circulating pre-culture medium. The scanning electron microscopy (SEM) pictures of the carrier show that the yeast cells are absorbed and embedded to the rice hull pore. In liquid batch fermentation system with an initial sugar concentration of 50 g/L, nearly 100% total sugar was consumed after 48 hours. This resulted in an ethanol yield of 0.32 g ethanol/g glucose, which is 62.7% of the theoretical value. Ethanol productivity of 0.59 g/(L.h) is 2.3 fold higher than that of free cells which is 0.26 g/(L.h). An effort to reuse the immobilized cells in liquid fermentation system showed poor results due to cell desorption in the first batch which led to high sugar concentration inhibitory effect in the second batch fermentation. This might be solved by using semi solid fermentation process in the future work.