

## **Abstract**

Both the matrix structure of loofa sponge and the flocculating property of cells were necessary for efficient immobilization. The addition of chitosan to a reactor containing a bed of loofa sponge and a *Candida brassicae* cell suspension induced cell flocculation and the cells were efficiently immobilized. During ethanol production by the immobilized cells, the free cell concentration in the broth was controlled at the desired level by intermittent addition of chitosan to the reactor. The immobilized cell concentration increased but their specific ethanol productivity decreased with an increase in the chitosan concentration. The maximum ethanol productivity was obtained at a low chitosan concentration of 0.03 g/litre. With this optimal concentration, the cell concentration, ethanol yield and productivity were, respectively, 2, 1.3 and 3 times higher than those of the suspension culture.

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