

## **Production of an Ice Binding Protein from *Flavobacterium frigidis* PS1 by Fermentation of *Pichia pastoris***

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### **ABSTRACT**

To survive in sub-zero temperatures, polar organisms produce Ice Binding Proteins (IBPs) in internal organs. These IBPs prevent formation of large intracellular ice crystals, which have fatal effects on the organism. We have isolated FfIBP, the IBP from the Gram-negative bacterium *Flavobacterium frigidis* PS1 from the Antarctic sea ice. FfIBP was cloned and produced by recombinant *Pichia pastoris* by using fed-batch fermentation with methanol feeding for 120 h. The laboratory-scale (7-L) production of FfIBP was performed to optimize the culture conditions such as pH and temperature. The optimal temperature and pH were determined to be 30 °C and pH 5.0 for FfIBP production. The total amount of secreted protein was ~519 mg/L, 50 % of which was FfIBP, yielding ~259 mg/L. The highest thermal hysteresis (TH) activity of FfIBP was about 1.7 °C from fermentation sample at 120 h. These results provide key aspects associated with the large-scale production of an ice binding protein, FfIBP.