

## Functional Cell Surface Display Using Ice Nucleation Protein from *Erwinia ananas* on *Escherichia coli*

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**Abstract :** Cell surface display is the expression of a protein with an anchoring motif on the surface of the cell. This approach offers advantages when used in bioconversion in terms of easier purification steps and more efficient enzymatic reaction. A surface display system using ice nucleation protein (InaA) from *Erwinia ananas* as an anchoring motif has been constructed to display xylanase (xyl) on the surface of *Escherichia coli*. The InaA was truncated so that it is made up of the N- and C-terminal domain (INPANC-xyl) and it has successfully directed xylanase to the surface of the cell. A study was also done on xylanase fused to two other ice nucleation proteins, InaK (INPKNC-xyl) and InaZ (INPZNC-xyl) from *Pseudomonas syringae* KCTC 1832 and *Pseudomonas syringae* S203 respectively. Surface localization of the fusion protein was verified using SDS-PAGE and Western blot on the cell fractions and all anchoring motifs were successfully displayed on the outer membrane of *E. coli*. Upon comparison, whole-cell activity of INPANC-xyl was more than six and five times higher than INPKNC-xyl and INPZNC-xyl respectively. Furthermore, the expression of INPANC-xyl on the surface of *E. coli* did not inhibit the growth of the cell. This is the first report of surface display system using ice nucleation protein, InaA from *E. ananas*. From this study, this anchoring motif offers an attractive alternative to the current surface display systems.

**Keywords :** cell surface display, *Escherichia coli*, ice nucleation protein, xylanase

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