

Expression of Functional Recombinant Mussel Adhesive Protein Type 3A in *Escherichia coli*

김영수, 황동수, 차형준*

포항공과대학교, 화학공학과 및 분자생명과학부, 분자생물공학연구소

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Mussel adhesive proteins, including the 20-plus variants of foot protein type 3 (fp-3), have been suggested as potential environmentally friendly adhesives for use in aqueous conditions and in medicine. Here we report the novel production of a recombinant *Mytilus galloprovincialis* foot protein type 3 variant A (Mgfp-3A) fused with a hexahistidine affinity ligand in *Escherichia coli*, and its ~99% purification with affinity chromatography. Recombinant Mgfp-3A showed a superior purification yield and better apparent solubility in 5% acetic acid (prerequisites for large-scale production and practical use) compared to those of the previously reported recombinant *M. galloprovincialis* foot protein type 5 (Mgfp-5). The adsorption abilities and adhesion forces of purified recombinant Mgfp-3A were compared with those of Cell-Tak (a commercial mussel extract adhesive) and recombinant Mgfp-5 using quartz crystal microbalance analysis and modified atomic force microscopy, respectively. These assays showed that the adhesive ability of recombinant Mgfp-3A was comparable to that of Cell-Tak but lower than that of recombinant Mgfp-5. Collectively, these results indicate that recombinant Mgfp-3A may be useful as a commercial bioadhesive or an adhesive ingredient in medical or underwater environments.

References

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