

Characterization and Functional Study of Antifreeze Protein

ApAFP752 from the Desert Beetle *Anatolica polita*

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Abstract

Antifreeze genes *Apafp752* isolated from Xinjiang desert beetle *Anatolica polita* in previous work was constructed with expressive plasmids and the corresponding mature peptide has been expressed in *E. coli*. The thermal hysteresis activity (THA) of ApAFP752 was measured by micro-liter osmometer or differentiated scanning calorimeter (DSC), and the modification of the ApAFP752 to ice crystals was observed. The antifreeze activity of the ApAFP752 was further confirmed by assay of the cryopreservation of the proteins on the bacteria in vitro. The study focused on the heat stability, pH stability and the hydrophilicity of the ApAFPs was performed. And the enhancing effects of some salts, polyhydroxyl and polycarboxyl compounds on recombinant ApAFP752 was assayed. The secondary structure of the ApAFP752 was derived from the data of circular dichroism (CD), and 3-dimensional structure was predicted based on the homologous protein from *Tenebrio molita*. In this study, the cryoprotective effects of the recombinant ApAFP752 on lactic dehydrogenase was determined.

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