Sakae Tsuda, J Bioanal Biomed 2018, Volume 10
DOI: 10.4172/1948-593X-C1-038

11th EUROPEAN BIOSIMILARS CONGRESS

April 26-27, 2018 Rome, Italy

Application of new quality products of type I–III antifreeze proteins and antifreeze glycoprotein

Sakae Tsuda
National Institute of Advanced Industrial Science and Technology, Japan

A typical ice block is composed of numerous single ice crystals that are created in water during freezing. The crystals grow and merge together to form an ice block, if the temperature remains below 0°C. Type I-III antifreeze proteins (AFPs) and antifreeze glycoprotein (AFGP) accumulate on the surfaces of embryonic ice crystals to inhibit their growth and merging, resulting in an aggregate of tiny ice crystals instead of an ice block. This function of AFP will be useful for the preservation of a variety of water-containing materials such as processed foods, soups, ice creams, noodles, breads, vegetables, seeds, drinks, alcohol, medicines, cosmetics, gels, cells, tissues, and organs. In keeping the size of each ice crystal to a minimum, AFP use may greatly improve the effectiveness of preservation. In addition, fish-derived AFPs bind to the lipid bilayer to prolong the lifetime of cells under hypothermic condition (+4°C), a function that may be applicable to short-term cell preservation or "cell pausing". It should be noted that each AFP and AFGP sample is always a mixture of 2-13 isoforms, which function together far more effectively than any single isoform. We have therefore developed preparation method of quaity products of fish type I-III AFPs and AFGP, and examined their applicability in both industrial and medical fields. An example of application is fabrication of highly porous material using "gelation & freezing method". In this method, we first prepare a solution containing gelatin, ceramic powder, and AFP to be cooled to form a cylindical shape of gel. This AFP-containing gel is then placed on a frozen plate to induce unidirectional freezing. Since AFP binds onto the side (prism plane) of the elongating ice crystals, extremely sharpened and uniformly aligned ice needles are created in the frozen gel. After sintering at 1,000°C, a ceramic containing numerous unidirectionally-aligned dendritic pores is created. The quality products of AFP and AFGP may realize more advanced techniques that have been expected by many great pioneers of this field.

Biography

Sakae Tsuda has completed his PhD at the Hokkaido University (Japan) and Postdoctoral studies at the University of Alberta (Canada). His research background is Biomolecular NMR, which gave him the skills of Biochemistry, Biophysics and Structural Biology. He is a Chief Senior Researcher of National Institute of Advanced Science and Technology, Japan and also a Professor of Hokkaido University. He has published around 110 papers. His current research target is the antifreeze proteins, which have originally been explored from Japanese organisms in the last 20 years.

s.tsuda@aist.go.jp

Notes: