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[\[PDF \(469K\)\]](#) [\[References\]](#)**The Development of α,α -Trehalose Production and Its Applications**Michio Kubota¹⁾, Ikuo Sawatani¹⁾, Kazuyuki Oku¹⁾, Kanou Takeuchi²⁾ and Sae Murai³⁾

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I. The development of trehalose production from starch. Two novel enzymes, malto-oligosyltrehalose synthase (MTSase, EC 5.4.99.15) and malto-oligosyltrehalose trehalohydrolase (MTHase, EC 3.2.1.141) were isolated from bacterial strains belonging to the genus *Arthrobacter*. It was found that trehalose was produced from starch by the joint reaction of both enzymes. We improved the enzyme-producing strain and established a method for the enzyme production. In order to increase the reaction yield of trehalose, several enzymes such as isoamylase and cyclomaltodextrin glucoamylase were added into the MTSase/MTHase reaction. We succeeded in the conversion of starch into trehalose in a high reaction yield of more than 85% by the multi-enzyme reaction. In 1995, Hayashibara Co. started a mass production of trehalose crystal powder, and now the production amounts to twenty thousand tons a year.

II. The application of trehalose. Trehalose has many good properties to improve the qualities of foods. The hydration activity of trehalose is applied to keep foods from damage by moisture or freezing. This saccharide has inhibitory actions on starch retrogradation, protein denaturation, fat oxidation and the deterioration of other nutrients such as vitamins or superoxide dismutase-like components. The interaction with minerals is applied to prevent Ca insolubilization by phosphate or Mg elution from vegetables and meat. This saccharide also masks unpleasant taste and odors in foods. The acid production from trehalose by oral microbials is low compared to that from sucrose. Experiments using an ovariectomized murine model of osteoporosis suggested that ingestion of trehalose might be effective in the prevention of osteoporosis. In addition to these applications for foods, trehalose is a useful ingredient for

cosmetics and pharmaceuticals.

Key words: trehalose, malto-oligosyltrehalose synthase, malto-oligosyltrehalose trehalohydrolase, mass production, application



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