

Abstract of Presentation

Note: This paper should be typed in "Times New Roman" of 12pt.

Name (Underline the family name)

Shinya FUSHINOBU

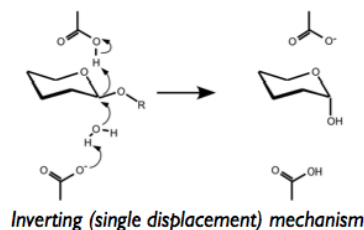
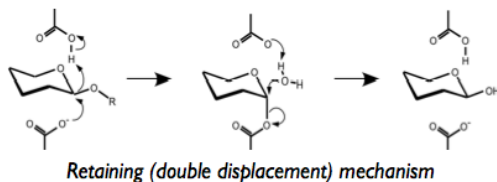
Presentation Title(Should be no more than 20 words):

Structural Biology of Carbohydrate-Degrading Enzymes that Contribute to Biotechnology

Abstract :

The main source of biofuels currently produced in North America is corn starch, and the ethanol fermentation requires a saccharification step by addition of amylase. To produce biofuels from cellulosic biomass practically, an efficient enzymatic saccharification method by addition of cellulase needs to be developed. "Amylase" and "cellulase" are generic names of various enzymes, glycoside hydrolases (GHs), which act synergistically with different mode of actions. To reduce the production cost through improvement of their functions, their 3-D structural information is required. Recent advances in structural biology revealed that the GHs have been evolved from various origins. On the other hand, most of their reaction mechanisms to cleave (hydrolyze) the glycosidic bonds belong to only two general mechanisms, retaining and inverting ones. We have determined a number of GH structures so far by X-ray crystallography, and revealed their mechanisms in substrate recognition and catalysis. I will present the results in the viewpoint of their variety in the 3-D structures and substrate recognition as well as their common ground in the reaction mechanisms. I will also present our recent results about the structural basis of enzymes that are practically used for production of functional oligosaccharides by virtue of their reverse reactions.

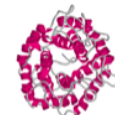
General reaction mechanisms of glycoside hydrolases



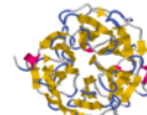
3-D structures of glycoside hydrolases



$(\alpha/\beta)_8$ Barrel



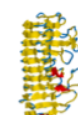
$(\alpha/\alpha)_6$ Barrel



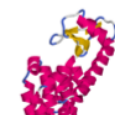
β -Propeller



β -Jelly roll



β -Helix



Lysozyme-like