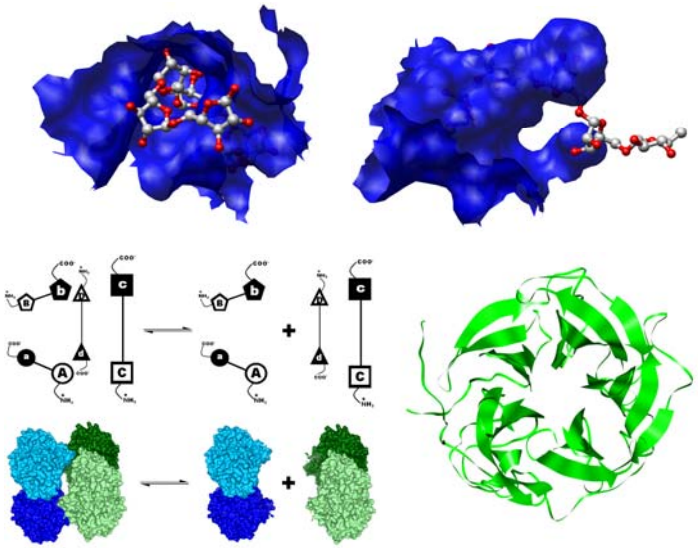
The most active β-xylosidase for conversion of biomass to ethanol



A. What is this technology?

β-xylosidase/arabinofuranosidase from *Selenomonas ruminantium* (SXA) is an enzyme that catalyzes the hydrolysis of xylooligosaccharides to xylose more efficiently than any other catalyst known, by at least a factor of ten. The enzyme-catalyzed rate is over a trillion times faster than the spontaneous rate.

B. What problem does it address?

Cost of enzymes is a major obstacle to their industrial application for hydrolysis of biomass for subsequent fermentation. β-xylosidase/arabinofuranosidase from *Selenomonas ruminantium* is 10-fold more active than other β-xylosidases in converting xylooligosaccharides to xylose. The greater activity of the enzyme means that its cost is reduced. We estimate that SXA would cost 0.5 cents per gallon ethanol produced.

C. What is the significance of this solution?

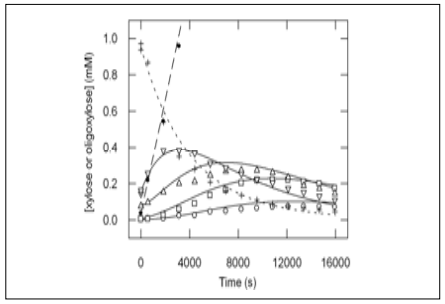
Lower enzyme costs will drive the production of bioethanol.

D. Who could use this technology?

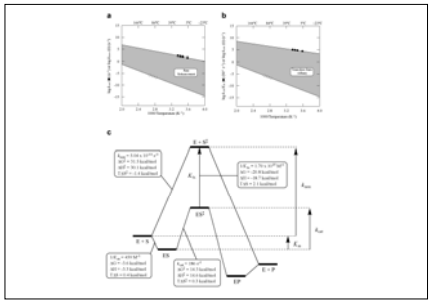
Producers interested in cost-effective enzymes for conversion of biomass to fuels or chemicals.

E. How is this technology unique?

The enzyme is 10-fold more active than other β-xylosidases. This means one tenth the cost.



SXA-catalyzed hydrolysis of xylohexaose.



Free energy profiles for the hydrolysis of xylobiose to xylose on and off the enzyme.

Stage of Development

U. S. Patent application, SN 11/904,577, Beta-xylosidases for conversion of plant cell wall carbohydrates to simple sugars, September 27, 2007 and PCT/US2007/081010, October 10. 2007, have been filed for this technology.

PARTNERSHIP OPPORTUNITY

Moving Forward

Reduced cost is needed for other enzymes of biomass saccharification. We are looking for highly active enzymes that catalyze other steps in the saccharification of biomass xylan: endoxylanase, arabinofuranosidase, glucuronidase, and galacturonidase.

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