# Single step process for making high-value chemicals like xylose and arabinose from hemicellulose

## EXECUTIVE SUMMARY

Improved single step hydrolytic process for generating high value chemicals such as xylose and arabinose from hemicellulose

## BACKGROUND

Xylose is a high value material and is used to derive xylitol which has wide range of applications – as an artificial sweetener, oral care products, food additives etc. Conventional processes to produce xylose from hemicellulose are highly corrosive and non-environmentally friendly due to use of mineral acid catalysts and the pH at which enzymes involved work. They are also expensive due to high energy input required and the erosion faced by the reactor material due to the super acidic nature of the reactions.

## TECHNOLOGY DESCRIPTION

NCL scientists have developed a one pot, single step hydrolytic process for conversion of hemicellulose to xylose and arabinose. The process operates under milder reaction conditions (pressure range of 1-70 bar and reactor temperature of 50-250°C).

## MARKET POTENTIAL

- The market size for xylitol in 2007 was around USD 300-600 million and is expected to grow by > 50% globally (as more people become health conscious)*,**
- EU accounts for 50% of world's production of xylitol, followed by Asia (30%) and then the US (20%) **

*http://www.hs.fi/english/article/Xylitol+is+gone+but+the+memory+lingers+on/1135230733013 (cited- 01/06/2012),
**http://www.koreatimes.co.kr/www/news/special/2009/07/129_9089.html (cited-01/06/2012)

## VALUE/ADVANTAGES

- Raw material (hemicellulose) used is cheap, easily available, and is derived from non-edible sources
- The product-catalyst separation can be done by simple filtration (heterogenous solid acid catalyst used is insoluble in the reaction medium, whereas the products are soluble)
- The process is anti corrosive and environment friendly since water is the reaction medium and process operates at a neutral pH
- Cost effective due to the reaction being non-corrosive in nature and hence industrially applicable

## APPLICATIONS

- Generation of xylose, arabinose, glucose, furaldehyde, oligomers, etc. which can be further processed to produce value added chemicals such as xylitol, arabinitol, etc.

## TECHNOLOGY STATUS

- Demonstrated at the lab scale
- On the lookout for potential partners for spin-off and licensing
- Patents filed: IN# 2889DEL2010, WO/2011/092711

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