

# Development and Demonstration of an Integrated Biofuels and Chemicals Production Platform based on Ionic Liquids

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## Overview

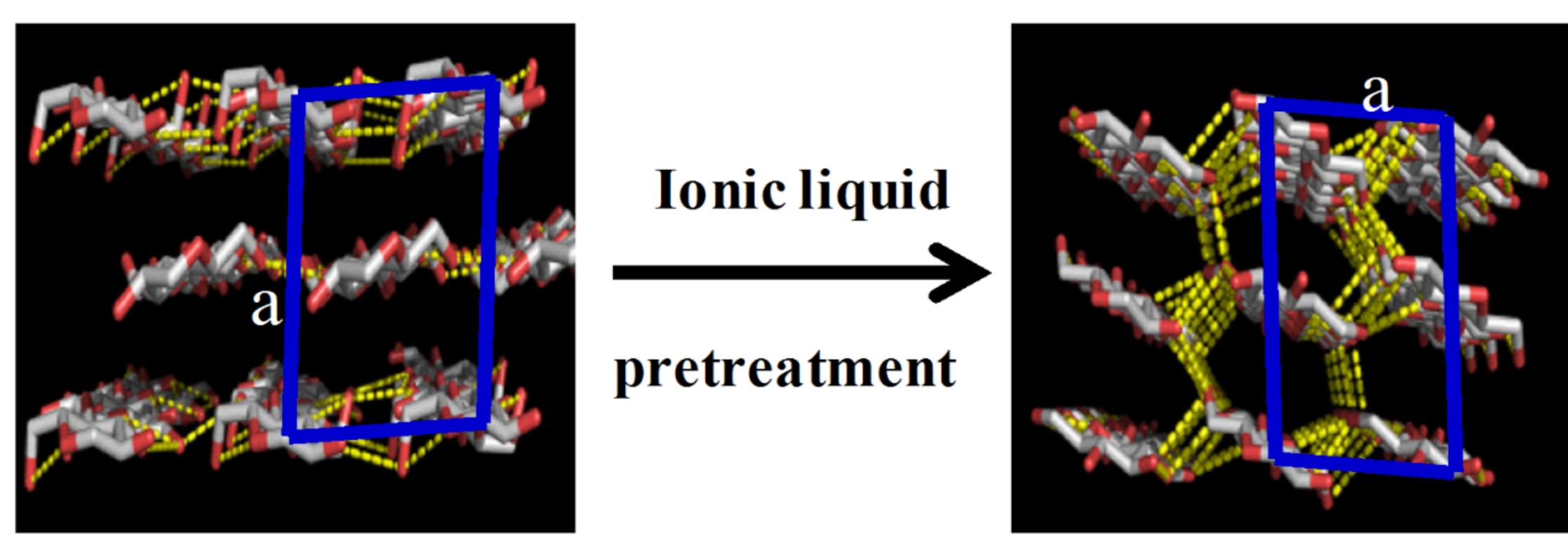
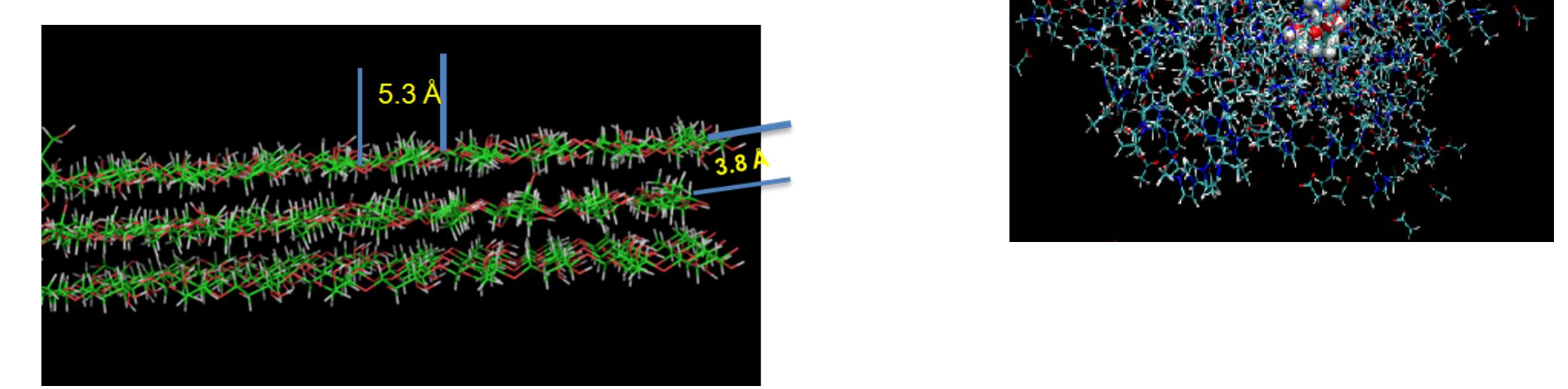
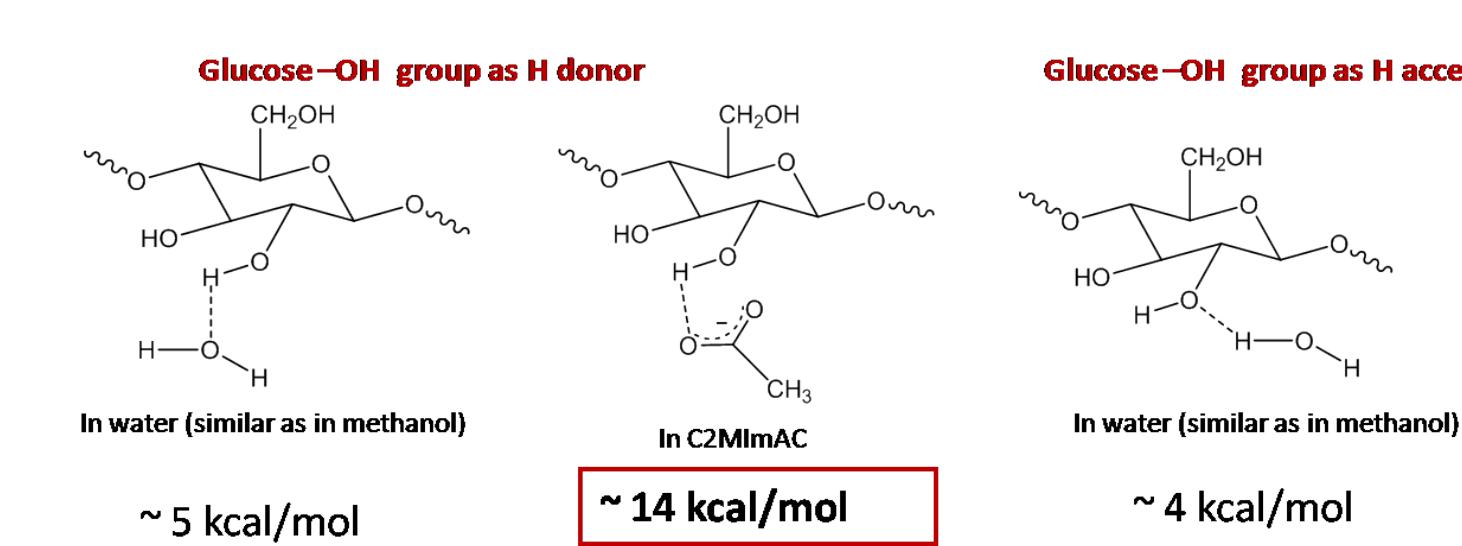
Lignocellulosic biomass is an abundant renewable feedstock with great geographical diversity and a great opportunity for the production of various commodities such as biofuels, chemicals and biomaterials. JBEI has an integrated approach for biomass to biofuels based on ionic liquids (IL). Ionic liquids are molten salts and have shown remarkable potential as a solvent and reaction media for highly efficient biomass pretreatment. We are using both computational and experimental approaches to understand the IL-biomass interaction and develop advanced biomass conversion technologies. We have developed several proprietary IL based biomass pretreatment and fractionation technologies, including the novel renewable ionic liquids, the new wash-free one-pot process, and efficient product recovery and IL recycle.

## Biomass Pretreatment using IL

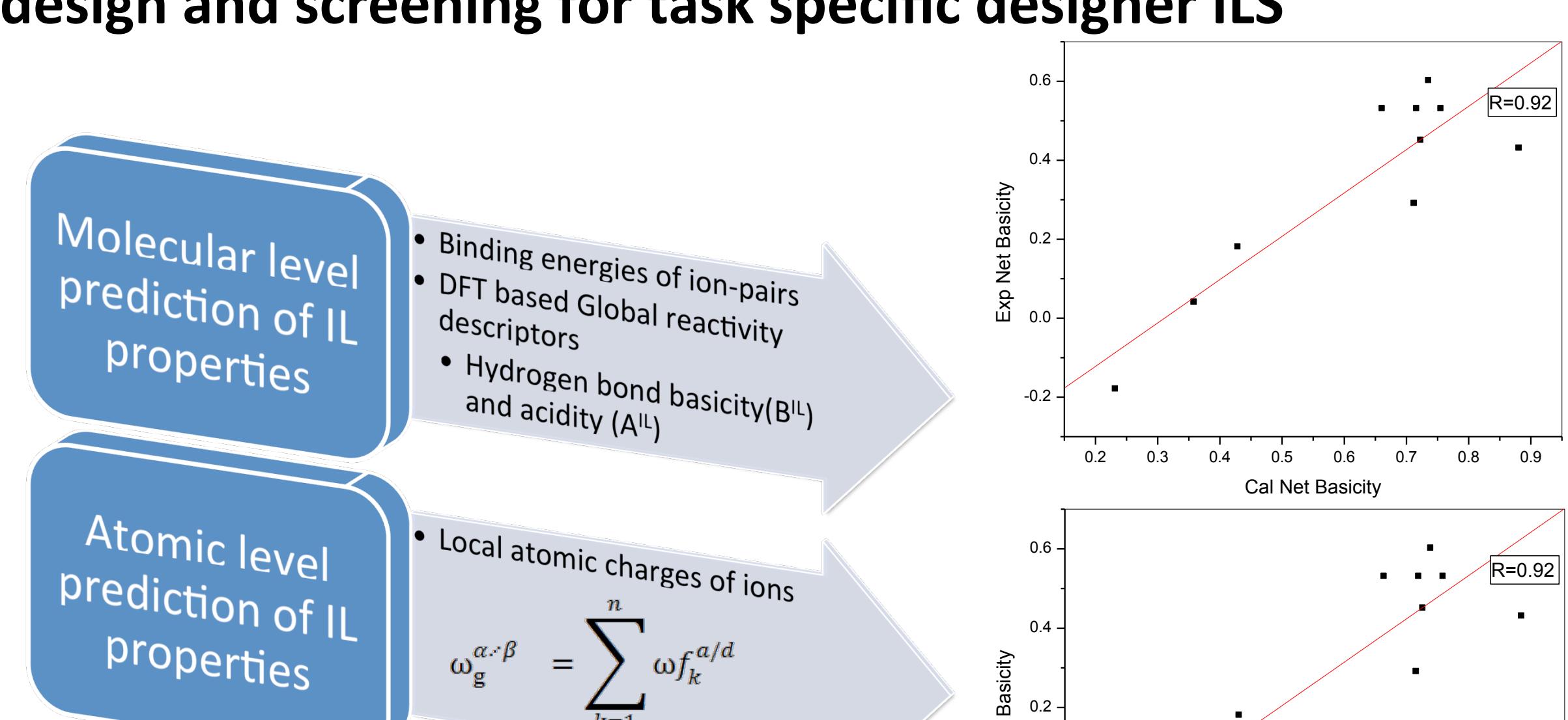
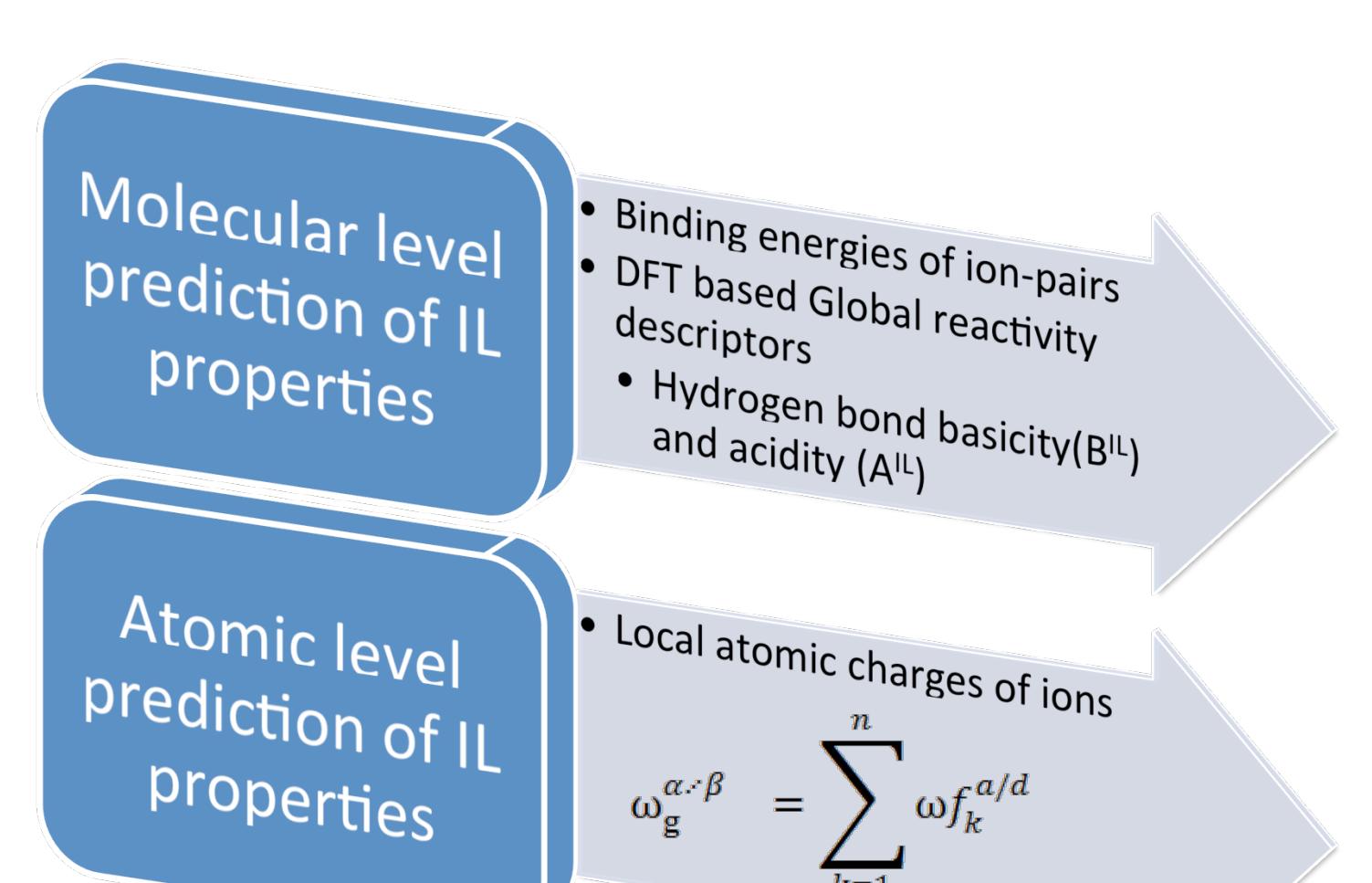


## IL Pretreatment: Science

MD simulations have provided unique insight into solubilization of biomass in ILs



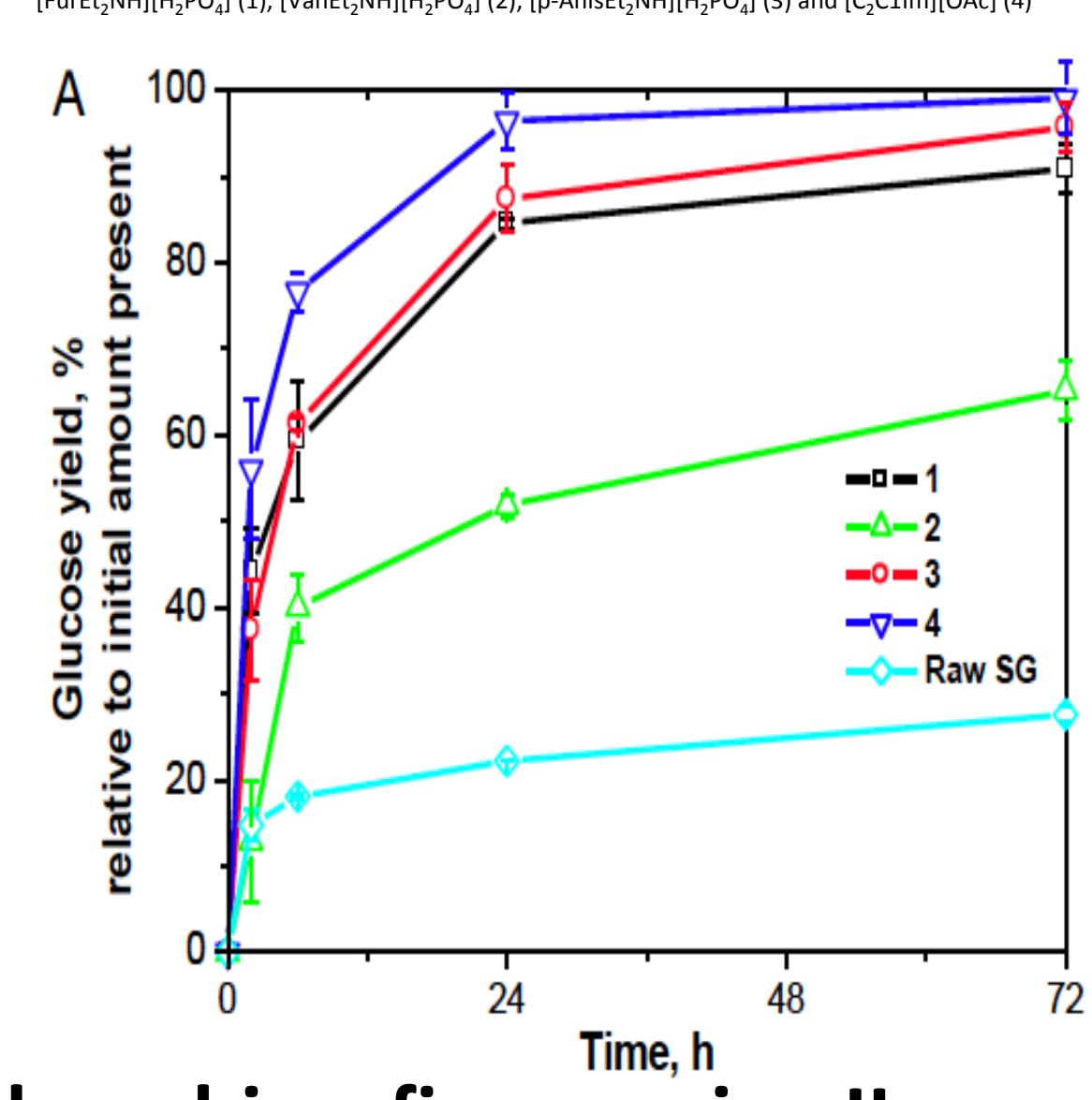
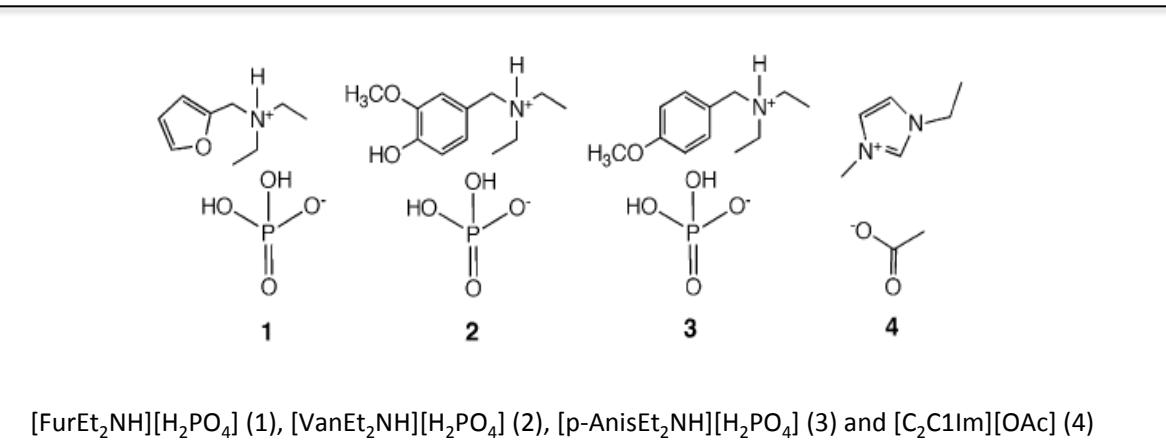
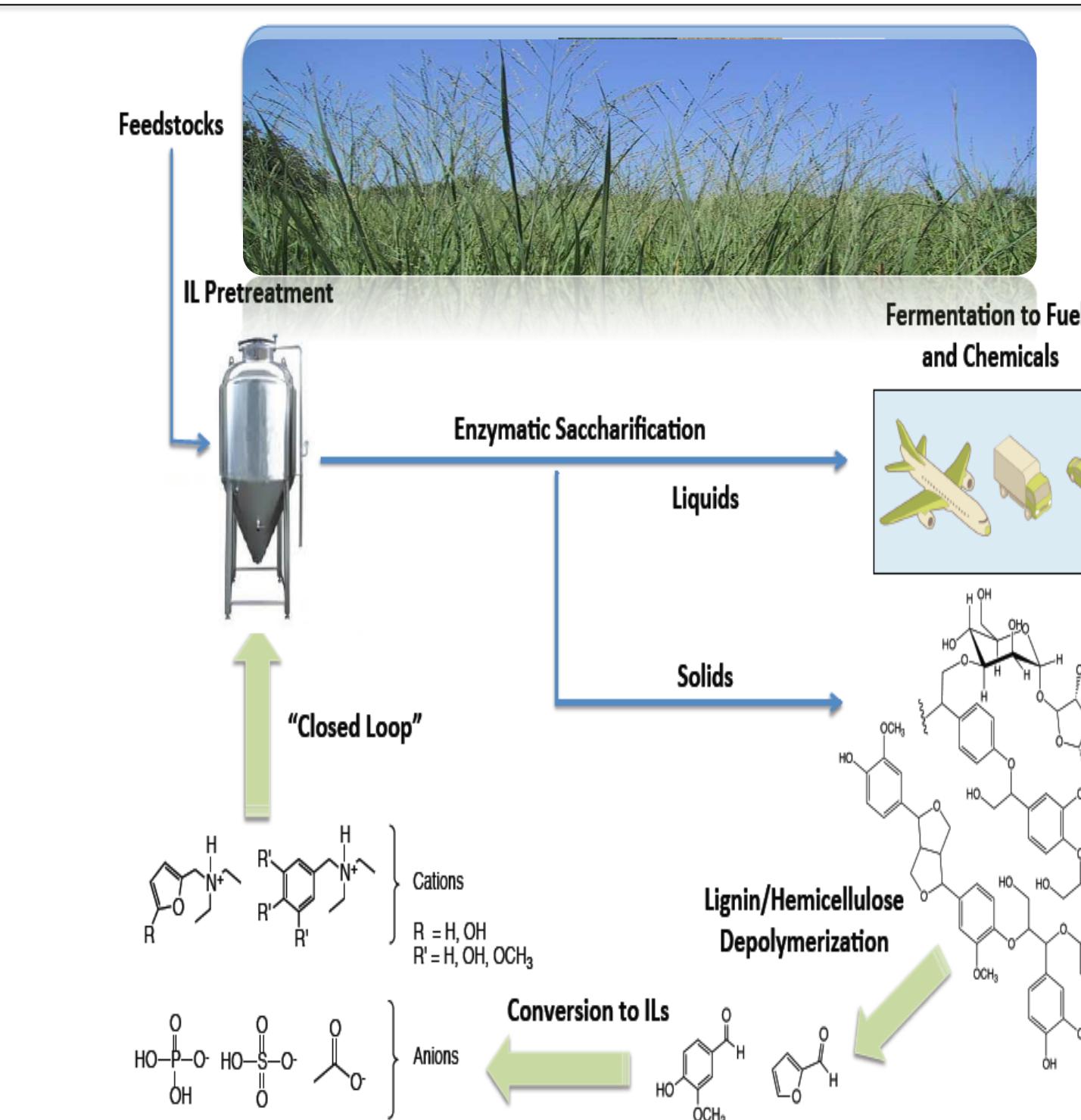
Developing predictive tools (based on Kamlet-Taft parameters, dielectric properties, etc.) to support new IL design and screening for task specific designer ILs



Feedstock flexibility  
Minimum sugar degradation  
No special reactor  
Sugar fermentability

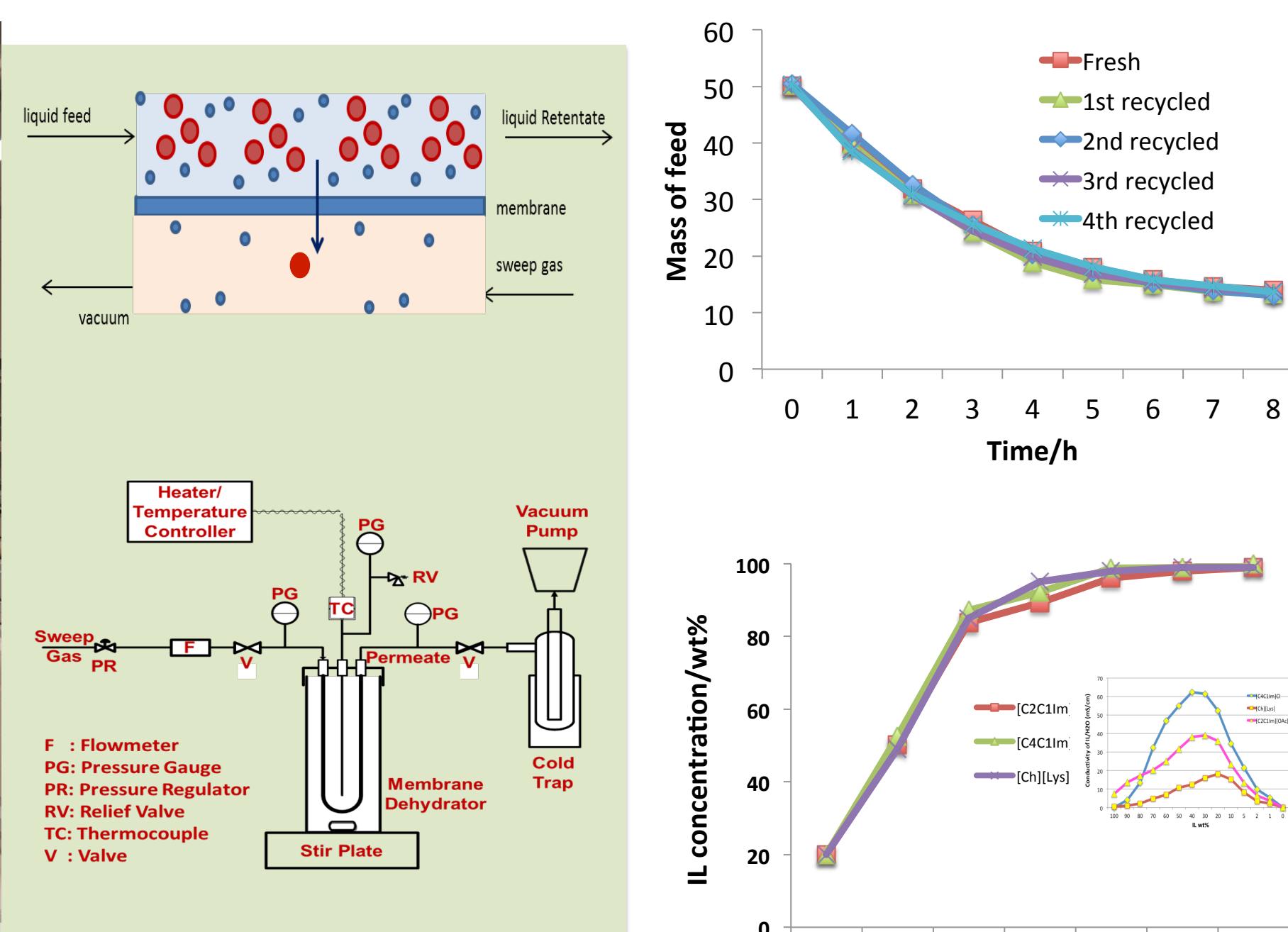
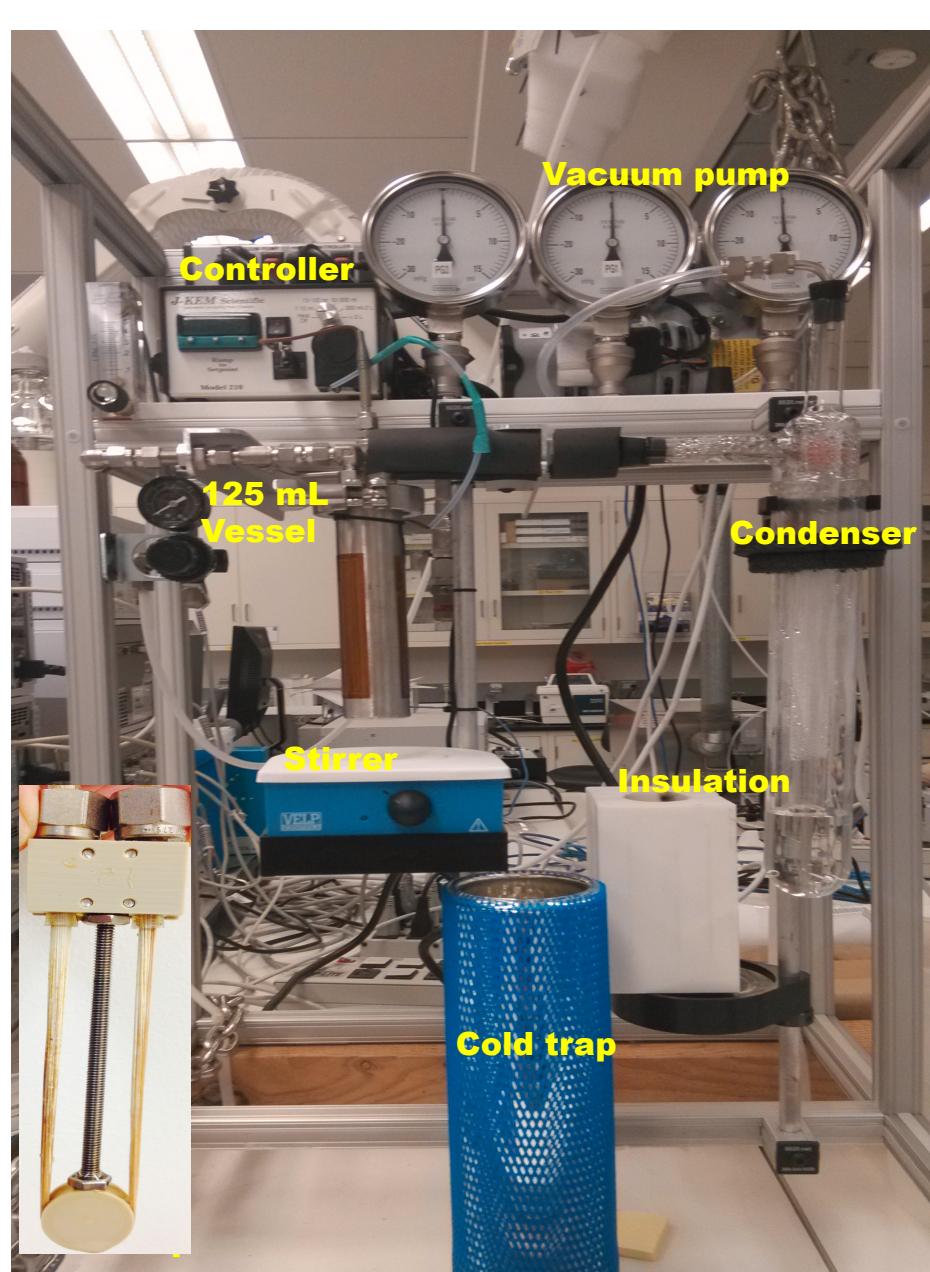
Highly digestible pretreated solid  
Milling/Grinding not required  
Sugar concentration >10%  
Lignin recovery/valorization\*

## Process Development

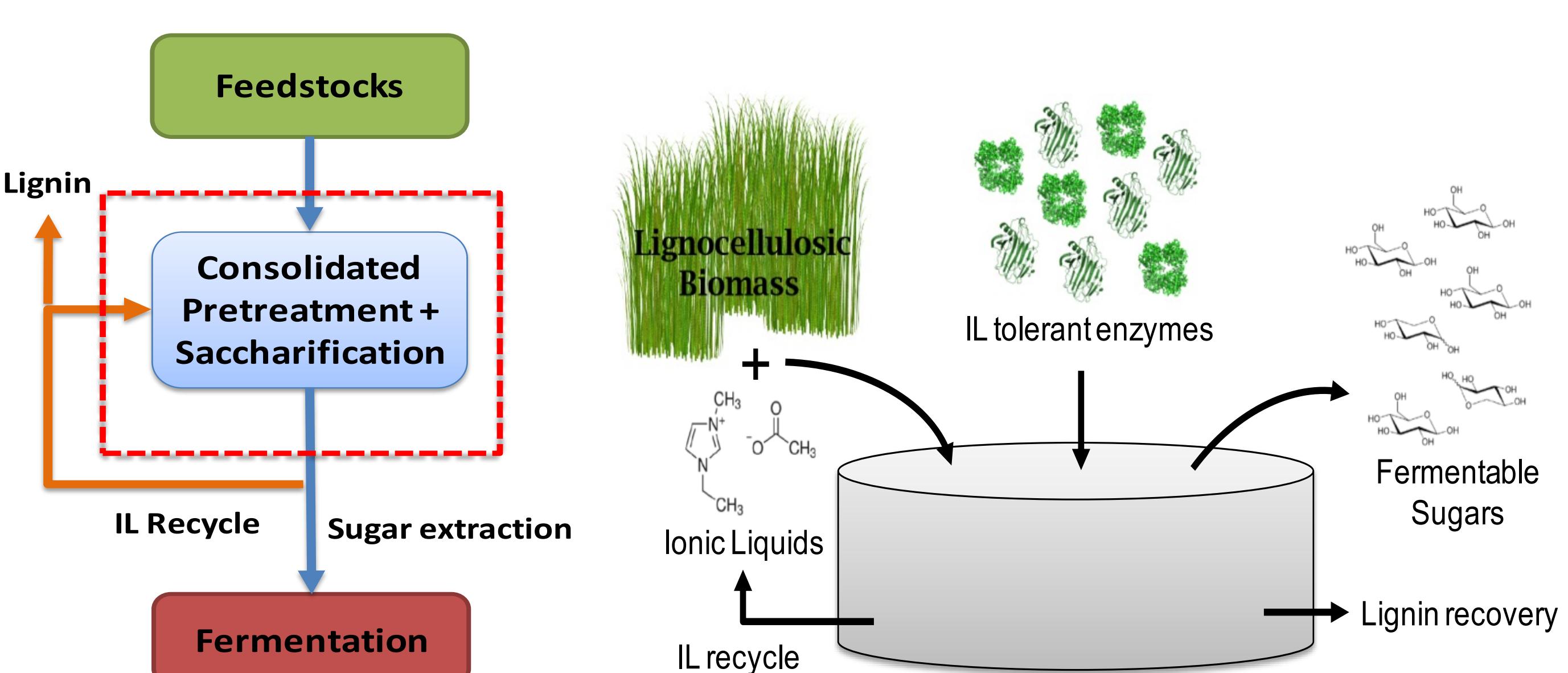


Hypothetical process flow for a closed-loop biorefinery using ILs derived from lignocellulosic biomass

### Pervaporation based IL recycle



### Novel one-pot lignocellulosic processing using JTherm



### Acknowledgement

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