

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

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Overview

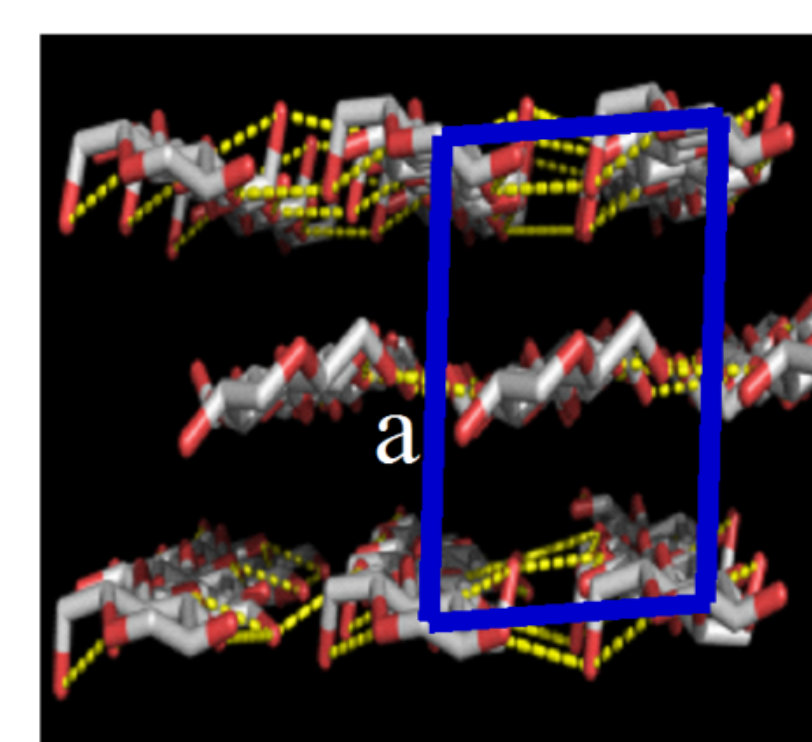
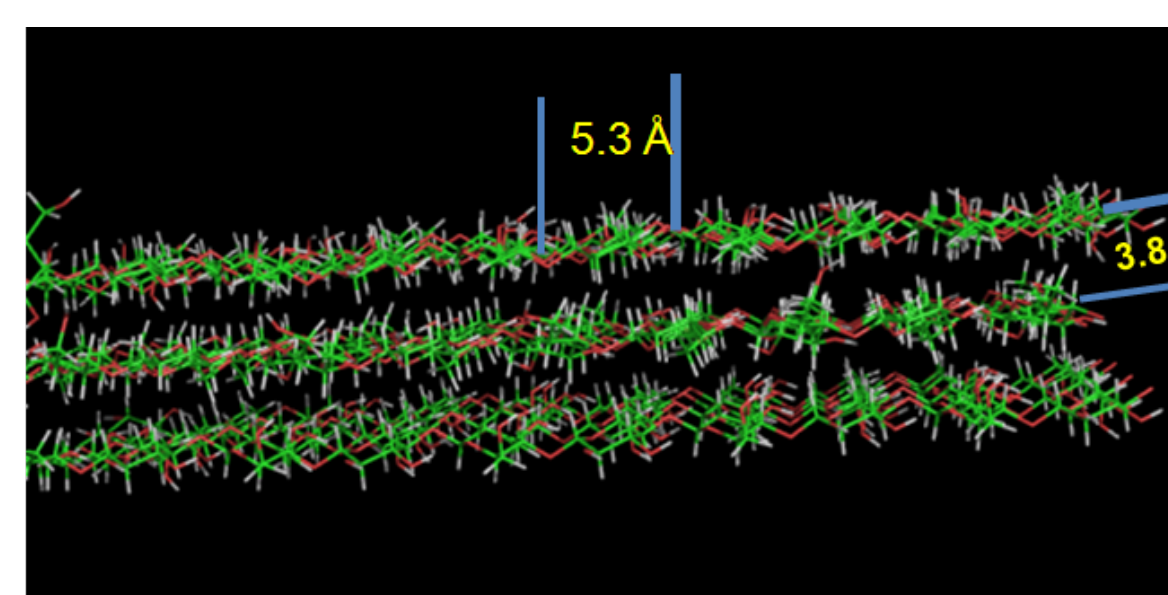
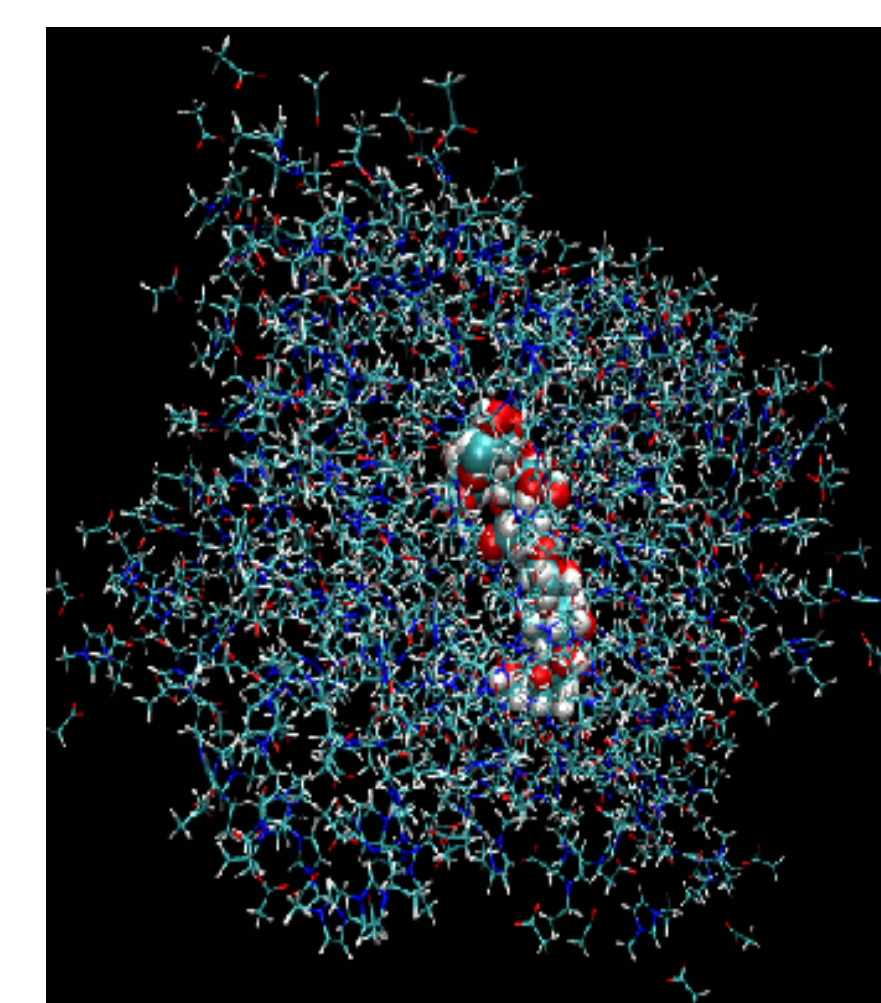
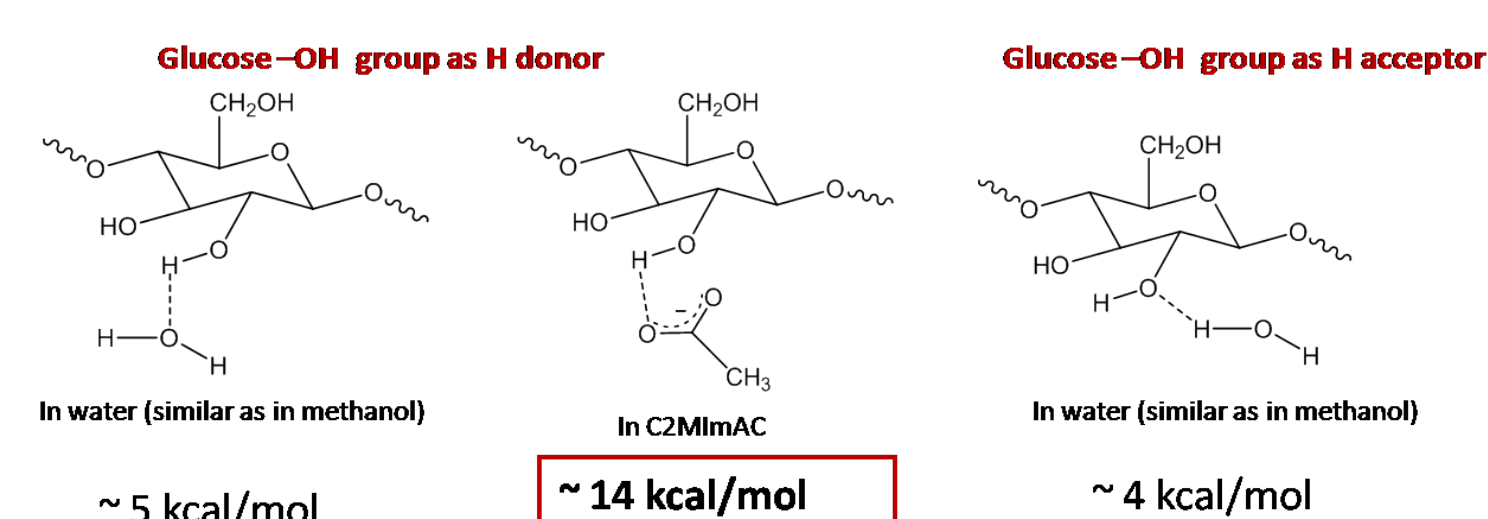
Lignocellulosic biomass is an abundant renewable feedstock with great geographical diversity and a great opportunity for the production of various commodities such as biofuels, chemicals and biomaterials. JBEI has an integrated approach for biomass to biofuels based on ionic liquids (IL). Ionic liquids 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

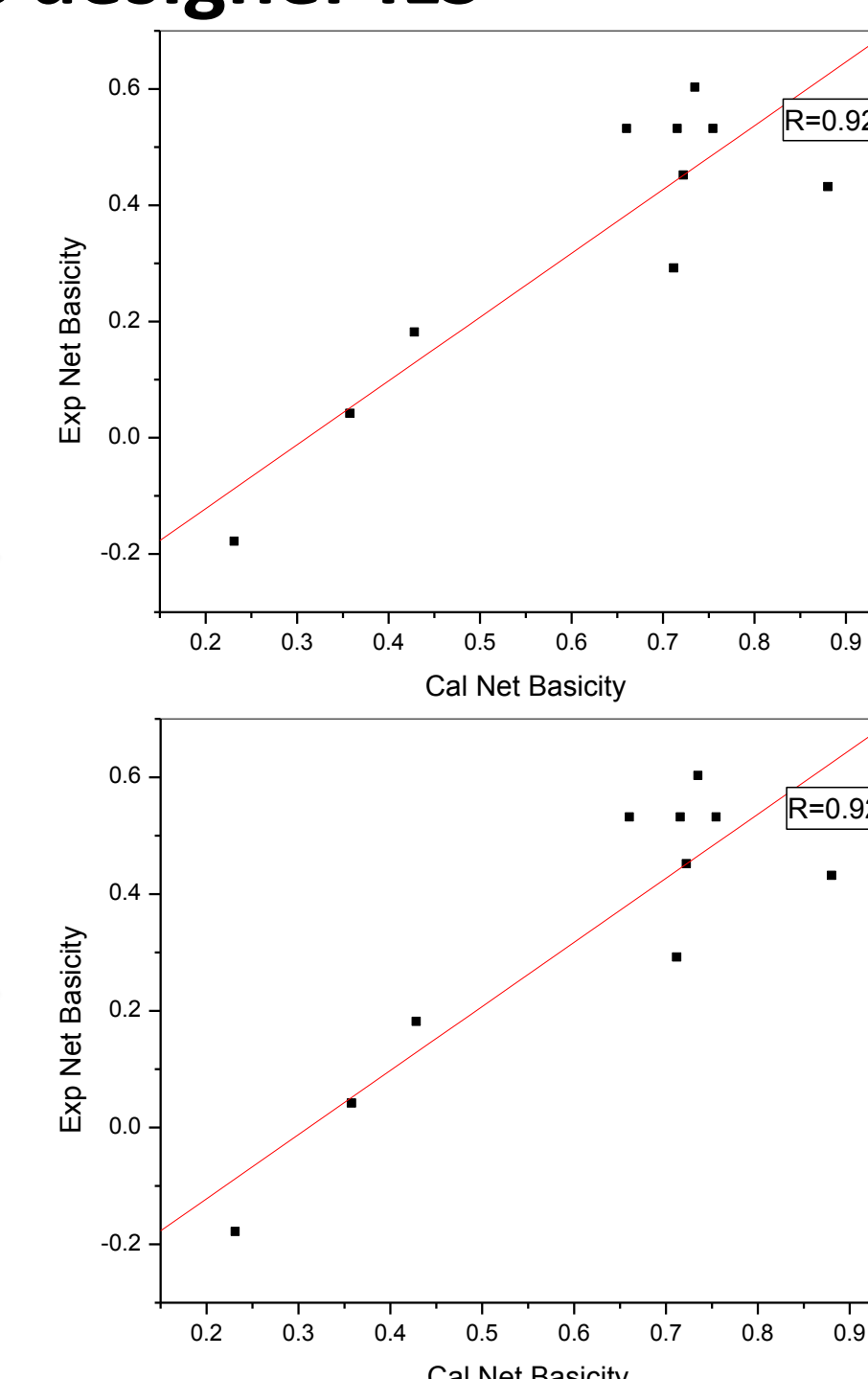
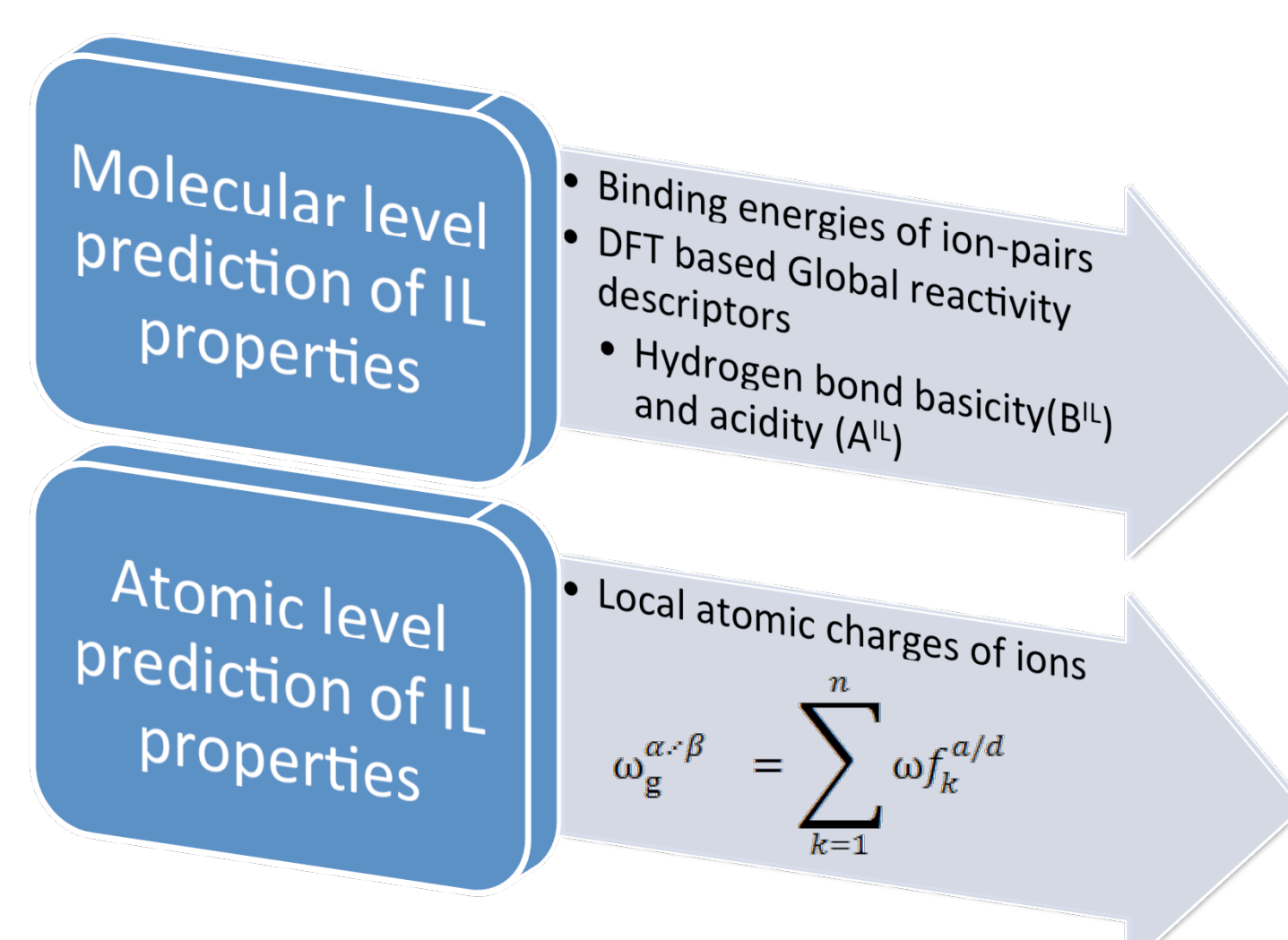


Ionic liquid
pretreatment

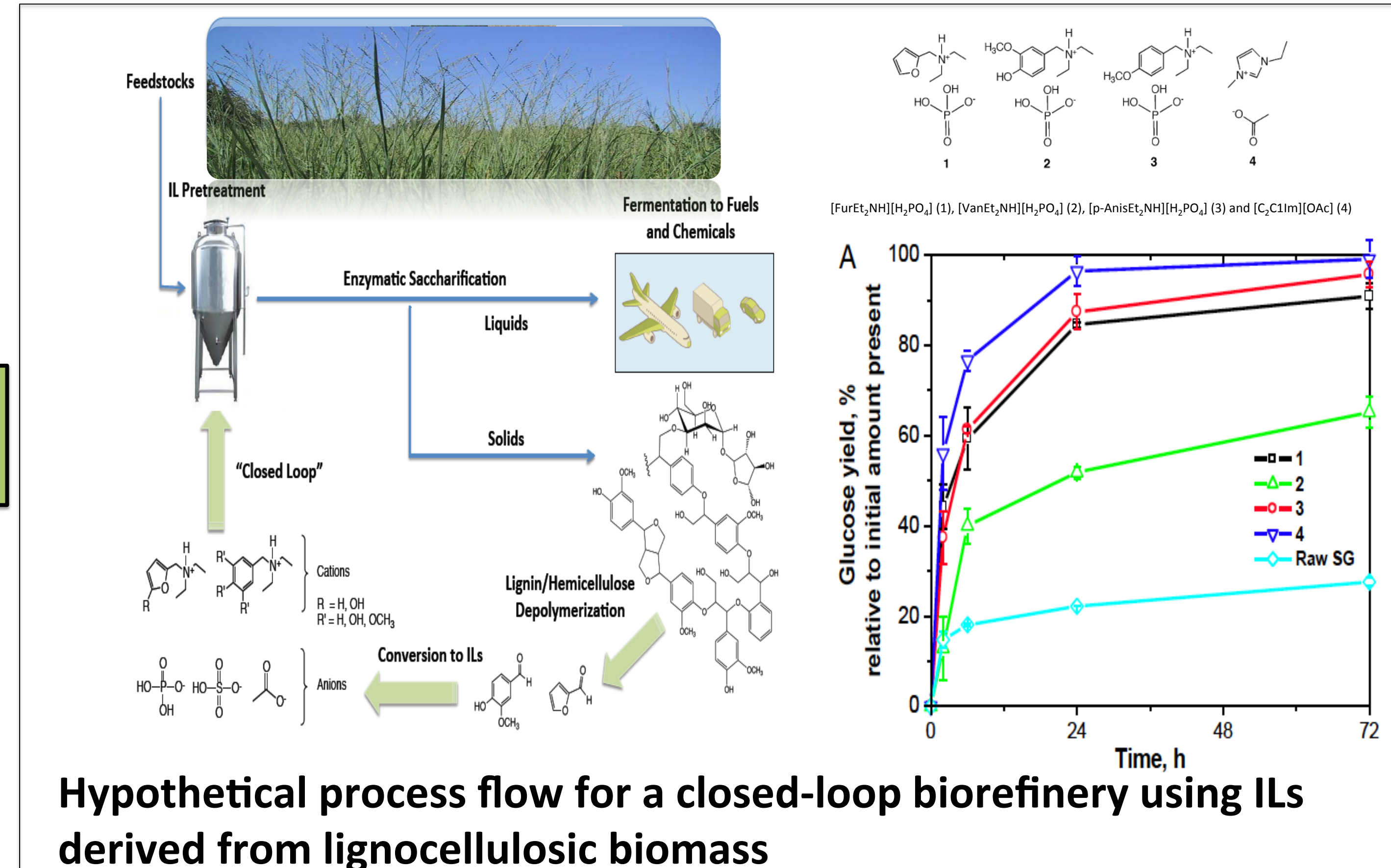
Cellulose Iβ

Cellulose II

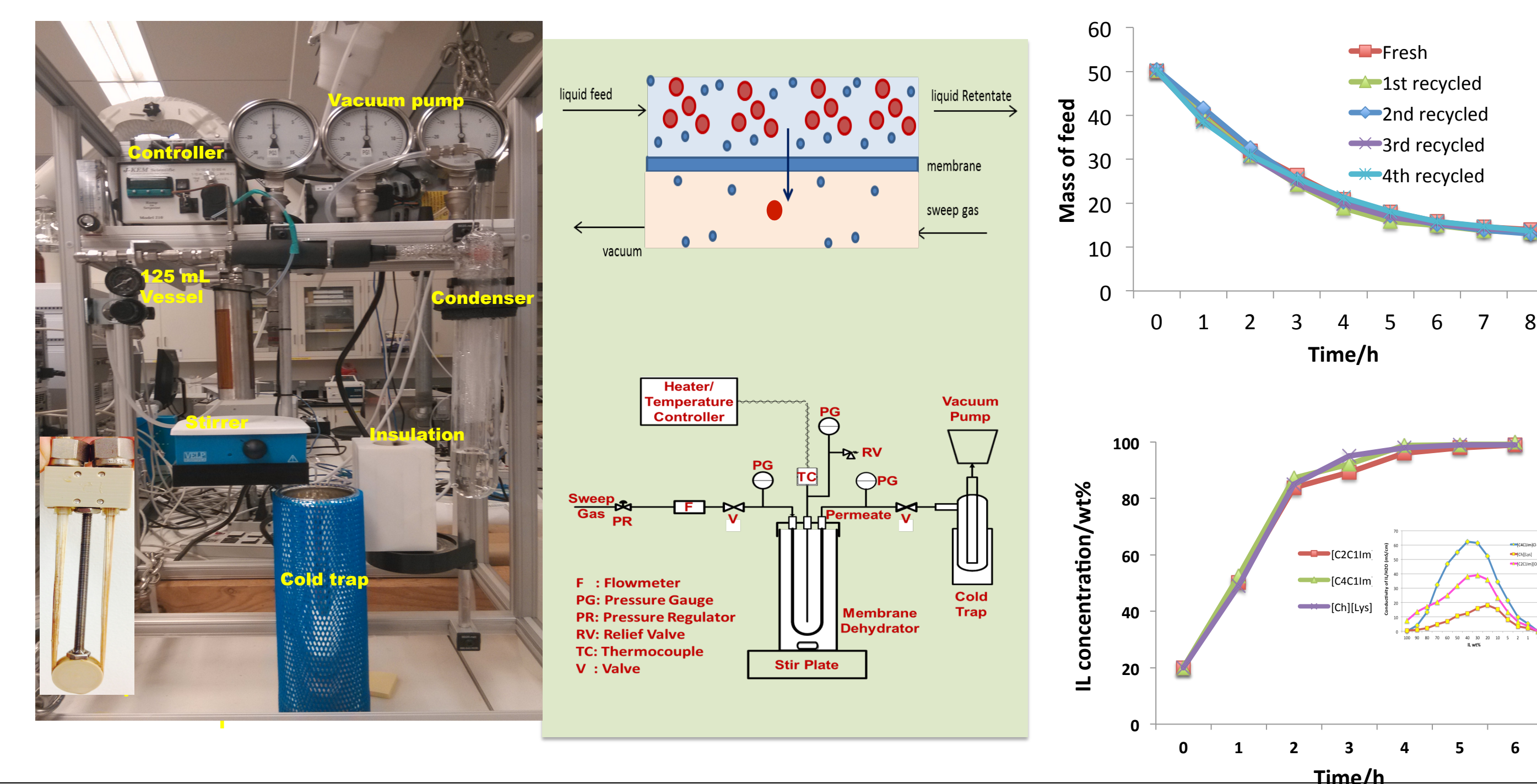
Developing predictive tools (based on Kamlet-Taft parameters, dielectric properties, etc.) to support new IL design and screening for task specific designer ILS



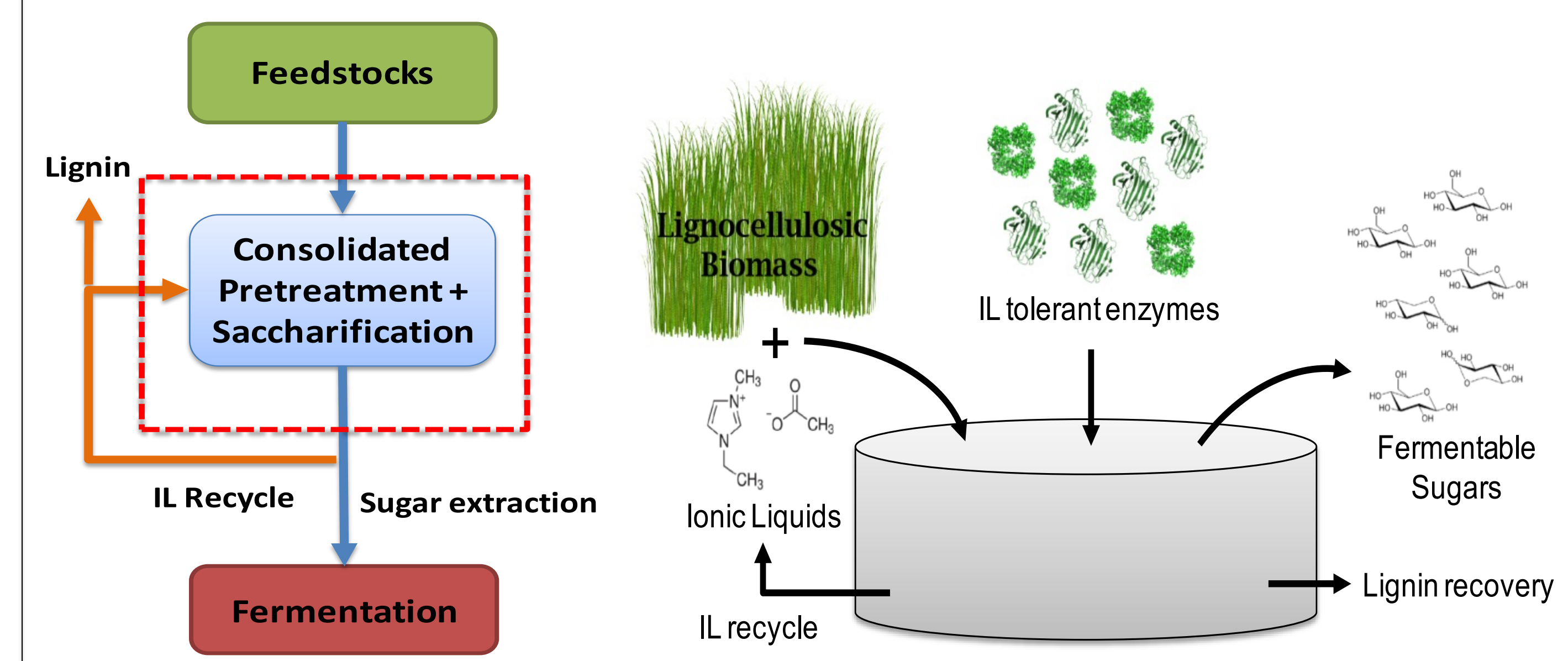
Process Development



Pervaporation based IL recycle



Novel one-pot lignocellulosic processing using JTherm



Acknowledgement

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Feedstock flexibility
Minimum sugar degradation
No special reactor
Sugar fermentability

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