



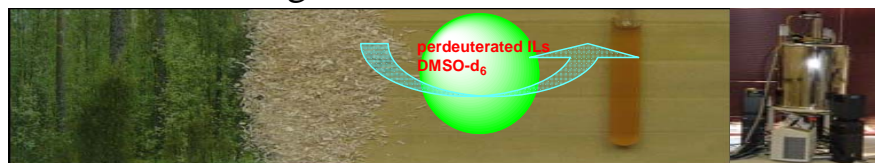
'Advanced Biomass Characterization'

Nan Jiang



PROGRAM DESCRIPTION

- Characterization of plant cell walls, particularly lignin, is crucial for biofuel and biomaterial research.
- Development of novel ionic liquid system for biomass dissolution.
- Direct dissolution and NMR analysis of the whole plant cell walls via perdeuterated ionic liquids.
- Determination of inter-unit lignin bonding, lignin content, H:S:G lignin ratios; hemicelluloses, LCC



Direct dissolution and NMR analysis of biomass

TECHNICAL DETAILS



- Pyridinium-based ionic liquid [Hpyr]Cl prove optimum for IL/DMSO-d₆ bi-solvent system for biomass dissolution.
- Perdeuterated ionic liquid [Hpyr]Cl-d₆ was simply prepared for NMR characterization of the plant cell walls.
- Both ball-milled and Wiley milled (20 mesh) biomass samples can be dissolved in [Hpyr]Cl-d₆/DMSO-d₆ (solubilities up to 100mg/g).

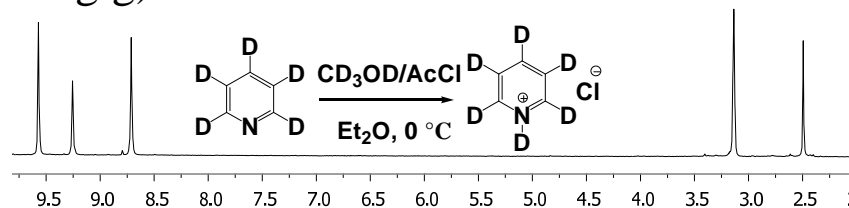


Fig 2. Preparation and ¹H NMR spectra of [Hpyr]Cl-d₆

PAYOFF

- ¹³C NMR spectra of biomass show detailed lignin structures and be used to determine H/S/G lignin ratio.
- 2D HSQC spectra of biomass give H, S, G lignin cross signals and other lignin side-chain signals.
- ¹H NMR spectra can be used to determine lignin content via Linear Extrapolation method.
- Facile characterization of whole cell biomass
- Improved processing of biomass to biofuels

KEY ACCOMPLISHMENTS

- Develop novel perdeuterated system for direct dissolution and NMR characterization of biomass
- ¹³C NMR and 2D HSQC spectra of biomass reveal detailed lignin structure.
- ¹H and ¹³C NMR analysis of biomass provide fast and efficient determination of lignin content and H/S/G lignin ratio.
- Identify key recalcitrance components of biomass



Professor AJ Ragauskas, Supervisor



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