

# Recent Advances in Biomass Characterization and Modeling – Special Journal Issue led by CBI researchers

## Background

- The development of biorefining has become the main impetus for developing innovative analytical techniques to assess the characteristics of biomass feedstocks and products. Biomass characterization and modeling has emerged as its own research field. It is an essential step in maximizing the benefits of biomass as energy, chemical, and material feedstocks by optimizing current and new biomass processes.

## Approach

- Recognizing the importance of biomass characterization and modeling, a virtual special issue (VSI) entitled “Recent Advances in Biomass Characterization and Modeling” in the *ACS Sustainable Chemistry & Engineering* was organized to solicit and showcase recent contributions to this emerging field.

## Outcomes

- The VSI contains 2 perspectives and 26 research articles (including JBEI and GLBRC) to provide the latest advances in analytical methodology and modeling to characterize biomass feedstocks and biomass-derived products.
- Advanced analytical methods that measure the mechanical, chemical, physical, biological, and other properties of biomass and biomass pyrolysis products are described along with their application’s limitations in two perspectives.
- Various NMR technologies for the characterization of biomass components such as lignin including semi-quantitative HSQC, quantitative  $^{13}\text{C}$ ,  $^{13}\text{C}$  attached proton test, HSQC TOCSY, HMBC, DEPT-135  $^{13}\text{C}$ , and  $^{31}\text{P}$  NMR are introduced in this VSI.
- High spatial resolution image techniques such as Stimulated Raman scattering and atomic force microscopy were used to provide *in situ* visualization and quantification of biomass components in the plant cell wall of biomass.

## Significance

- These advances in characterization will seed further developments toward the optimization of biomass feedstocks, process intermediates, and the final biorefinery products.

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