

## **Exploring phenolic and polysaccharides compounds in lignocellulosic biomaterials**

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The current lack of understanding of fundamental interactions between phenolic and polysaccharide compounds in lignocellulosic-based materials critically hinders the efficiency of biomass to biofuel conversion and the design of new high value materials derived from these processes. Recent efforts in probing these molecular interactions suggest that a multiscale interdisciplinary approach is required. Conventional imaging and spectroscopy should be complemented with novel state-of-the-art analytical metrology tools that offer chemical speciation with high sensitivity and nanoscale spatial resolution. Novel platforms combining atomic force microscopy (AFM) and infrared spectroscopy (IR) with spatial resolution beyond 100 nm were recently used to explore the variations in chemical content in Poplar cell walls.

In this talk, we will first briefly review promising approaches that have been used to obtain to reveal nanoscale details in the chemical, mechanical and structural properties of plant cell walls. Next we will discuss how an IR-AFM platform can be adapted to the local composition of plant cell walls. The evolution of the biopolymer behavior as a function of temperature in the system will be presented. Finally, we will highlight the importance of statistical tools to establish relationships between the observations made at the nanoscale and at larger scales, pondering on the complexity of natural variations associated with such systems.