Hydrolytic Enzymes, their Structure-Functional Studies and Biomass Transformation into Second Generation Biofuels.

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Bioethanol production, “green” technologies and renewable resources became recently one of the major focuses of bioscience and engineering worldwide. Brazil is one of the leading countries in agricultural development and biomass growth and utilization, which has several natural advantages in the race for sustainable biofuels development. However, there are a number of obstacles to be overcome to establish enabling technologies for biomass-to-fuels transformation. Enzymatic hydrolysis is one of the most important steps in the deconstruction of biomass on the way to production of second generation biofuels, which must be optimized and integrated with pre-treatment and fermentation to allow complete transformation of biomass into biofuels and chemicals.

Given a fact that catalytic activities of enzymes are defined and mediated by their three-dimensional structures and molecular mobilities, it would be difficult, if not impossible, to obtain profound comprehension of their catalytic activities without thorough molecular, biophysical, biochemical, computational and structural studies. Moreover, there is an urgent need in better knowledge of enzymatic recognition of soluble and insoluble substrates and synergistic action with other lignocellulolytic enzymes. In this talk we will discuss our results in structural, biophysical and biochemical characterization of glycosil hydrolases and an improvement of enzymatic cocktails applied to sugar cane bagasse hydrolysis and plans for the future.