



**Politechnika  
Śląska**

## **ROZPRAWA DOKTORSKA**

*„Wykorzystanie metod chemicznych i enzymatycznych w transformacji celulozy  
i odpadów przemysłu rolnego do produktów typu Fine Chemicals”*

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**Thesis title:** The use of chemical and enzymatic methods in the transformation of cellulose and agricultural waste into *Fine Chemicals*

**Abstract:** Limited reserves of fossil fuels are no longer an academic problem, but a real global challenge. One of the solutions is to use widely distributed renewable lignocellulosic biomass as raw materials in the chemical industry. Nowadays, a dynamic development of lignocellulosic biomass and polysaccharides processing can be observed. Methods that are part of the sustainable development trend are particularly desirable. Therefore, treatment, including processing with ionic liquids and enzymes, are the subject of this dissertation. Waste lignocellulosic biomass, like walnut waste, sawmill chips and green garden wastes, were used as a raw material. The aim was to process simple sugars (glucose and fructose), cellulose and lignocellulosic biomass into levulinic acid, 5-hydroxymethylfurfural and/or glucose. Obtained products can be also building blocks for other valuable compounds, so methods of levulinic acid esters and trehalose production were also proposed.

**Keywords:** cellulose, lignocellulosic biomass, ionic liquids, enzymes, levulinic acid, 5-hydroxymethylfurfural, levulinic acid esters, trehalose