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Sommario/riassunto	In the last decades, inedible lignocellulosic biomasses have attracted significant attention for being abundant resources that are not in competition with agricultural land or food production and, therefore, can be used as starting renewable material for the production of a wide variety of platform chemicals. The three main components of lignocellulosic biomasses are cellulose, hemicellulose and lignin, complex biopolymers that can be converted into a pool of platform molecules including sugars, polyols, alchols, ketons, ethers, acids and aromatics. Various technologies have been explored for their one-pot conversion into chemicals, fuels and materials. However, in order to develop new catalytic processes for the selective production of desired products, a complete understanding of the molecular aspects of the basic chemistry and reactivity of biomass derived molecules is still crucial. This Special Issue reports on recent progress and advances in the catalytic valorization of cellulose, hemicellulose and lignin model molecules promoted by novel heterogeneous systems for the production of energy, fuels and chemicals.