Università degli Studi di Napoli Federico II

PhD in Biotechnology - 37th cycle

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Identification and exploitation of (hyper)thermophilic (hemi)cellulases and new enzymes for waste products recycling

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The complete bioconversion of waste products requires a complex process whose basic steps are: (1) mechanical or chemical pre-treatment, (2) saccharification step by acid or enzymatic hydrolysis to break down polysaccharides into simple sugars (hexoses and pentoses), (3) microbial fermentation of the monosaccharides to ethanol or chemical building blocks and (4) separation and concentration of the final bioproducts (Musatto et al 2010). As a result, the use of enzymes had increased due to their efficient and sustainable ability in degrading many kinds of waste, leading to efforts in the identification and characterization of new enzymes to be exploited in novel and competitive industrial bioprocesses (Adrio and Demain 2014; Gurung et al 2013). Carbohydrate-active enzymes (CAZymes), showing remarkable stability to high temperatures and resistance to extreme pHs and high concentrations of detergents and organic solvents, are of particular interest for biotechnological applications requiring industrial processes in harsh conditions (Strazzulli et al 2020). In this context, (hyper)thermostable and thermoactive CAZymes degrading recalcitrant polysaccharides and oligosaccharides like cellulose, xylan and mannan into their monomeric constituents are of particular interest (Egorova and Antranikian, 2005).

References

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