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## Immobilization and application of laccase preparation

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The application of the white rot basidiomycetes (WRB) and especially their lignin-modifying enzymes in various industrial biotechnologies and in bioremediation of wastewater and soil polluted with the emerging organic pollutants (EOP) requires their huge production and stabilization. In this study, production of laccase by two most promising enzyme producers (*Trametes versicolor* and *Cerrena unicolor*), isolated and identified from the Georgian forest, was optimized in submerged fermentation conditions and laccase preparations were isolated from the culture liquids by ammonium sulfate precipitation. Two obtained laccase preparations and, for comparison, commercial laccase from *Trametes versicolor* were immobilized on the fumed silica nanoparticles (fsNP) with APTES modification in order to increase their stability and to provide their separation from the reaction mixture and reusability. The coupling procedure for fsNP-laccase conjugates was optimized to bind as much as possible of the initially applied laccase and to obtain the highest loads of laccase activity on the fsNP. Among the enzyme preparations, immobilization of *T. versicolor* laccase was the most effective - 4.0 U g<sup>-1</sup> fsNP, with

immobilization yield of 121% and the washing loss of 3.1%. Immobilization yield of *C. unicolor* laccase achieved 133% with the least washing loss - 0.9%; however, enzyme load was only 2 U g<sup>-1</sup>. Finally, the immobilization yield for commercial laccase preparation was the highest (172%), but the washing loss was 3.2% and enzyme load was 2.5 U g<sup>-1</sup>. We have tested laccase preparations for degradation of micropollutants of wastewater. There was shown that immobilized laccase preparations appeared to be appropriate tools for elimination of diclofenac and Bisphenol A.

### Speaker Biography

Vladimir Elisashvili is a director of the Animal Husbandry and Feed Production Institute of the Agricultural University of Georgia. In 1974, he obtained his PhD in microbiology at the Saint Petersburg (Leningrad) State University. Then, he continued his work at the chair of microbiology as a scientist and assistant professor. In 1983, he joined the Durmishidze Institute of Biochemistry and Biotechnology, Tbilisi, Georgia and in 1993, he obtained the Doctor of Biological Sciences degree in biochemistry. In 1976/77, he obtained a postdoc position at the Institute of Molecular Biology, Paris VII, France. In 2001-2006, he worked at the Free University of Brussels and in two biotechnological companies in Israel. He has over 190 publications and supervised 21 PhD theses. He is serving as an editorial board member of three reputed Journals.

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