OMICS Group Conferences
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International Conference on
Functional and Comparative Genomics & Pharmacogenomics

November 12-14, 2013 DoubleTree by Hilton Hotel Chicago-North Shore, IL, USA

A semi-rational approach to obtain a thermostable ionic liquid tolerant bacterial laccase through π-type interactions

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Laccases are particularly promising enzymes for biotechnology and bioremediation purposes. They are among the most effective enzymes capable to catalyze the degradation of phenolic compounds with poor water solubility. The technological utility of enzymes can be enhanced greatly by their use in ionic liquids rather than in conventional organic solvents or in their natural aqueous reaction media. In the current study, a laccase from Bacillus HR03 has been engineered through a semi rational method. Since the kinetic properties and structure of laccase was found to be affected by the composition of Luria Broth (LB) medium therefore Terrific Broth (TB) was used as an expression medium throughout the study. Mutants showing a distinct improvement in thermal stability and ionic liquid (1-ethyl-3-methyl imidazolium chloride [EMIm][Cl], butyl-3-methyl imidazolium chloride [BMIm][Cl] and hexyl-3-methyl imidazolium chloride [HMIm][Cl]) tolerance were selected, expressed and then characterized in detail. The two selected mutants (Glu188Tyr, Glu188Phe) showed an increased catalytic efficiency in ionic liquids. CD and fluorescence spectroscopy exhibited no significant changes in the structure of mutants and the wild type. According to bioinformatic analysis, it was assumed that mutations were stabilized through π-π and anion- π interactions.

Biography

F. Ghazi has completed her B.Sc. degree in biology from University of Tehran, Iran, M.Sc. degree in Molecular Genetics from Roosevelt University, Chicago, IL, and Ph.D. in Molecular Genetics from Essex University, UK. She is associate professor and head of Molecular Biology and Genetics department of Iran University of Medical Sciences. She has published more than 25 papers in reputed journals.

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