

more than other modes, and immobilization activity in the presence of magnetic field also showed enhancement.  $K_m$  for immobilized  $\alpha$ -amylase was found to be higher than that of the free enzyme, which may be due to interparticle diffusional mass transfer restrictions.

**Keywords:** Static Magnetic Field,  $\alpha$ -Amylase, Enzyme Immobilization, Kinetic Parameters.

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#### Abstract No.175

##### Interaction of Cu(II) Phthalocyanine and Porphyrines with Plasmid DNA and Their Antibacterial Properties

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Multiple resistances to antibiotics are a growing public health issue that is compounded by the inability of the pharmaceutical industry to generate new strains of antibiotics to combat infections. Identification of new antibacterial agents and exploitation of new approaches for the drug-resistant bacteria is in great demand. Among the novel developed antibacterial agents, porphyrin complexes have attracted much attention. Phthalocyanines differ from porphyrins by having nitrogen atoms link the individual pyrrole units. Tetrapyrrolineporphyrines are phthalocyanine aza analogs in which four pyridine moieties formally substitute four benzene moieties in the macrocycle. The tetramethylated quaternized forms of tetrapyrrolineporphyrines (tmtppa) are tetra-positively charged and hence water soluble. In this study, the antibacterial effect of an anionic phthalocyanine Cu(PcTs) and two cationic tetrapyrrolineporphyrine including [Cu(2,3-tmtppa)]<sup>4+</sup> and [Cu(3,4-tmtppa)]<sup>4+</sup> complexes towards *Staphylococcus aureus* and *Escherichia coli* growth were investigated. In addition, their interaction with plasmid DNA was studied using spectroscopic and gel electrophoresis methods. The results indicated that both porphyrines have significant antibacterial properties against the Gram negative and the Gram positive bacteria. but, Cu(PcTs) has a very weak antibacterial effect. Gel retardation assay implied that [Cu(2,3-tmtppa)]<sup>4+</sup> (the figure is shown) and [Cu(3,4-tmtppa)]<sup>4+</sup> degrade plasmid DNA and Cu(PcTs) causes no retardation in movement of the plasmid. Stern-Volmer dynamic quenching constant, binding constant and number of binding sites for interaction of the complexes with plasmid DNA were measured using analyzing of the fluorescence and absorption spectroscopic data. The

results indicated interaction of [Cu(2,3-tmtppa)]<sup>4+</sup> and [Cu(3,4-tmtppa)]<sup>4+</sup> with plasmid are more stronger than Cu(PcTs).

**Keywords:** Interaction, Phthalocyanine, Tetrapyrrolineporphyrine, Antibacterial properties.

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#### Abstract No.176

##### Applying a Bi-chaperone System to Prevent Insulin Aggregation

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The aggregation of insulin is a big medical- and biotechnological challenges, therefore in this study a Bi-chaperone system consisting of  $\alpha$ -crystallin ( $\alpha$ -Crs) and  $\beta$ -casein ( $\beta$ -CN) with different molar ratios were applied to prevent insulin aggregation spectroscopically. These two proteins are amphiphilic, each contains distinct polar and non-polar regions in their primary structures. While polar domain of  $\alpha$ -Crs is highly electropositive, the counterpart domain in  $\beta$ -CN is strongly electronegative. The results of both fluorescence study and native gel electrophoresis confirmed a non-covalent interaction between  $\alpha$ -Crs and  $\beta$ -CN. Consequently the synergistic chaperoning operation observed in Bi-chaperone system can be explained with the possible electrostatic interactions between its chaperone components through their polar/charged domains. Furthermore, the results of this study may provide useful information to identify potential interacting molecular partners for  $\alpha$ -Crs chaperone.

**Keywords:** Alpha-crystallin, Beta-casein, Aggregation, Chaperone activity, Bi-chaperone system.

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#### Abstract No.177

##### Caseoperoxidase: Novel Peroxidase-Like Nano-Artificial Enzyme

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