SYNOPSIS

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Development of novel co-immobilization strategy of enzymes using three way junction of DNA

Enzymes have been an integral component of biosensors owing to their unique combination of high substrate specificity and amplification of product formation. This results in attractive signal transduction for very low concentrations of the target analytes. Biosensors have revolutionized the ability to detect analytes in clinical and environmental contexts. Nucleic acids secondary structure have gained prominence as structural scaffolds that permit facile functionalization and controllable stability. These have often been combined with the catalytic power of enzymes to produce different functional modules especially in or as biosensors. Utilizing the Watson-Crick base pairing and self-assembling capabilities of DNA, a lot of studies have been done for comparing the performance of enzyme cascade. Using three ends of three way junction of DNA for co-immobilizing multiple enzymes could improve upon the control over the immobilization of the enzymes Glucose oxidase (GOX), Cholesterol Oxidase (ChO) and Horse Radish Peroxidase (HRP). Several nanoconstruct designs have been explored towards the precise spatial positioning of enzymes constituting a cascade reaction. In this regard, the main hurdle experienced was the chemical conjugation of nucleic acids

with enzymes. In spite of the relatively small size changes of such conjugation and the inefficiencies of conjugation chemistries employed, the conjugation of an enzyme GOX and ChO on a DNA molecule was ultimately achieved.