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Biophotonics based biosensor systems for ultrasensitive detection

Biophotonics is an upcoming area of photonic based emission system from biological source and utilizing this property to develop highly sensitive system for bioanalytical purpose. Light generation by the biological elements such as luciferase enzyme systems, alkaline phosphatase, horse radish peroxidase and luminol system, have numerous applications in health, food hygiene, sanitation, toxin and pathogen diagnosis. These biomolecules being specific and highly sensitive find better prospects in future in the field of bioimaging, studying host pathogen interaction and developing ultrasensitive biomarkers. The present talk focuses on photonic based emission system for detecting food toxins and pathogens. The *lux* cassette is an array of genes that codes for bacterial bioluminescence. Recombinant bacteriophages carrying *lux* cassette is selective for a bacterium. Hence based upon the light emission selective bacterial pathogens can be quantified. The antibodies against food toxins can be generated into animal models such as poultry to get IgY antibodies. These antibodies have affinity towards its corresponding toxin. The bio-conjugation of luciferase enzymes with these antibodies can quantify the amount of toxin present in a sample through the intensity of light emission unlike conventional ELISA based methods. This method is popularly known as bioluminescent immunoassay (BLEIA). Further the *lux* marker gene has also been inserted into certain pathogenic microbes and its pathogenicity in animal models has been studied extensively elsewhere. Thus host pathogen interaction study may find immense help in drug discovery. Concluding, biophotonics based biosensor systems has dramatically improved the present state of available diagnostic methods and is futuristic.

Biography

M.S. Thakur has made significant contribution in biotechnology especially in biosensor research in India since past 30 years. He has published more than 100 outstanding research papers along with 15 patents. He has transferred his biosensor technologies to industries. As an expert in biosensor and biotechnology he has delivered many invited (more than 100) lectures and keynote addresses in national and international symposia. Dr. M. S. Thakur has made fundamental discoveries in bio-inspired biomolecular electronics and biophotonics, interfacing the biochemical events with opto-electronic systems making bioassay simple, specific, rapid and ultrasensitive which is very unique contribution. He has made appreciable contribution in understanding the opto-physical properties of nanoparticles and biomolecules using Fluorescence Resonance Energy Transfer and Bioluminescence Resonance Energy Transfer (BRET/FRET) phenomenon. He has solved the intricate problems associated with ultrasensitive detection of toxins, pesticides and vitamins using biophotonics and nanoparticles.

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