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Design and development of aptasensor for detection of heavy metals

The aptamers have potential to create new binding sites, if nanoparticles are functionalized by suitable way. The functionalization of nanoparticles is serious issue among the scientists. The attraction on aptamers is because of their stability, low molecular weight and their rapid and reliable synthesis and production. The interaction of aptamers with nanoparticles provides the more and more binding sites for target molecules and increases the sensitivity of aptasensor system. Gold and silver nanoparticles and their alloy are one of the most interesting sensing materials because of their unique size and shape dependent properties, high surface energy and surface-to-volume ratio and tunable surface properties. Aptamers are oligonucleotides that can bind their target ligands with high affinity. The use of these particles those are bio-conjugated with aptamers for selective and sensitive detection of analytes such as small molecules and metal ions, has been demonstrated. In this work Au, Ag and their alloy nanoparticles were prepared by chemical synthesis method and characterize by Zeta potential and TEM. The aptasensor were developed and applied for detection of arsenic(III), cobalt(II), lead(II), mercury(II) in real water samples. The several experiments were carried out with the variation of different parameters such as pH, concentration of nanoparticles and aptamers. We found that Ag-Au alloy NPs have very good efficiency towards detection of heavy metals. Analytical parameters and kinetics will be described in detail to know the nature and working mechanism of aptasensor. This presentation focuses on recent progress in the design and development of nano-biosensors based on aptamers (i.e., aptasensor) integrating functional aptamers with nanoparticles. Different aptasensor (i.e., Colorimetry, Fluorescence, Amperometry, Surface Plasmon Resonance, etc.) for detection of heavy metals with high sensitivity and selectivity will be described.

Recent Publications

- 1.Saran D, Gaur M S (2017) Investigation of Bio-Relaxation Mechanism in Human Blood. *Trends in Biomaterials & Artificial Organs*; 30: 14-20.
- 2.Sharma A K, Tiwari R K, Gaur M S (2016) Nanophotocatalytic UV degradation system for organophosphorus pesticides in water samples and analysis by Kubista model. *Arabian Journal of Chemistry*; 9: S1755-S1764.

Biography

Mulayam S Gaur has his expertise in chemical synthesis, biosynthesis, characterization of nanomaterial and their application to develop nano-biosensor and nano-medicine. He is having joint research project with National Centre of Biotechnology, Moscow, Russia. He has published 75 research papers in international reputed journals. He has received Bharat Shiksha Ratan Award in 2004. Currently he holds the position of Dean R&D and looking after the research program.

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