S 9-11

The Synthesis and Characterization of Bioconjugated Luminescent Semiconductor Quantum Dots (QDs) for Bacteriological Application.

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The Luminescent quantum dots (QDs) has wide spread applications in life sciences due to near ideal fluorophore properties like, its resistance to photo bleaching, tunable wavelengths, high band gap in excitation and emission. Although as of now they are commonly used in eukaryotic cells which are much bigger in size they are hardly been used for bacteriological studies. One of the major problems is size, where an average water soluble quantum dots (Cd/Se, ZnS coated) varies from 30-100nm or even more when bioconjugated with proteins or other biomolecules they cannot penetrate through the cell walls. Therefore in our study we try to manufacture really smaller size nano-particles from gold (Au) and bioconjugated with thiol- modified DNA for typical in-situ hybridization experiments. To improve the hybridization efficiency DNA substitutes like PNA (peptide nucleic acid) which are resistant nucleases is bioconjugated to QDs. Different functional groups such as -SH, COOH, $-NH_2$ are attached to C end or N end of the PNA and using these molecules it has been attempted to synthesize gold Nanoparticles *In-Situ.* In this study different approaches have been used to synthesize bio-applicable QD-DNA/PNA molecules and further characterized with TEM, SEM, and Dynamic Light Scattering (DLS).