

Abstract

Introduction and goal

MicroRNAs are non-coding sequences that are 18 to 28 nucleotides in length. These biological molecules play an important role in cellular processes. In particular, they affect the expression of proteins in the human body and the formation of cellular structures. One of the diseases that severely affect human societies are mental illnesses. Bipolar disorder is one of the most common and debilitating diseases that is mostly diagnosed on the basis of clinical symptoms, MicroRNA 134 has been shown to play a key role in the formation of the disease and in the manic phases its concentration in plasma is strongly increased. Researchers are using this microRNA as a diagnostic biomarker to enable more accurate diagnosis and follow-up of treatment. The aim of this thesis is to synthesize microRNA 134 biosensor and record the optical signal in the presence of miR-134 spiked into the blood plasma.

Methods

The dot quantum nanoparticles were first synthesized by the aqueous method and a thin gold coating was formed after mapping around it. After preparing the aforementioned nanoparticles, the particle surface properties and absorption and emission spectra are studied. Finally, the hybrid bonding of plasmonic nanoparticles with microRNAs and its optical properties are studied in buffer and plasma environments.

Findings

The dot quantum nanoparticles were obtained at 3.2 nm and increased to 6.7 nm after coating, allowing the coating of biomolecules, especially DNA strands. Various optimizations were made for the present biosensor, and the biosensor with a very low detection limit of 150 pg / ml in the appropriate linear range was able to generate a suitable and repeatable response within 21 minutes.

Discussion and conclusion

The biosensor was tested in serum and was able to detect microRNA 134 present in the serum, meaning it could detect microRNA 134 from blood samples taken from mania patients and detect the disease in a faster time.

key words

Mania, Nanotechnology, Nanoparticles, Quantum Dot, Micro RNA 134.