Co-ordinated split aptamer assembly and disassembly on Gold nanoparticle for functional detection of HIV-1 tat

Abstract

Human immunodeficiency virus (HIV) is a life threatening, weakens the immune system upon infection, thus ultimately resulting in the fatal health issues. This situation necessitates the generation of different strategies for HIV detection. HIV-1 Tat, a transactivator of HIV gene expression, was chosen in this study as the target of a non-functional split aptamer. Implementation of split aptamer has been demonstrated in this work for colorimetric detection of HIV-1 Tat. An unmodified gold nanoparticle (GNP)-based colorimetric assay was used for the visible detection of the proof, displays color transitions from red to purple in relation to the dose-dependency of HIV-1 Tat against the split aptamer in ionic solutions. The visible color transition was characterized using UV–vis spectrophotometer showing spectrum shift and supported by Scanning Electron Microscopy observation. With addition of sodium chloride, the color of the solution started to change to purple and spectrum started to shift to higher wavelength due to aggregation at HIV-1 Tat concentration as low as 10 nM. Specificity test was conducted with duplexed split aptamer and HIV-1 p24 has shown slight color changes. With HIV-1 Nef, GNP solution retains the color similar to the control, which indicated the specific split aptamer interaction to HIV-1 Tat.

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