**Aptamers Dimerization Inspired Biomimetic Clamp Assay towards Impedimetric SARS-CoV-2 Antigen Detection**

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**Abstract:**

Antigen-detecting rapid diagnostic testing (Ag-RDT) has contributed to containing the spread of SARS-CoV-2 variants of concern (VOCs). In this study, we proposed a biomimetic clamp assay for impedimetric SARS-CoV-2 nucleocapsid protein (Np) detection. The DNA biomimetic clamp (DNA-BC) is formed by a pair of Np aptamers connected via a T20 spacer. The 5'- terminal of the DNA-BC is phosphate-modified and then anchored on the surface of the screen-printed gold electrode, which has been pre-coated with Au@UiO-66-NH2. The integrated DNA-material sensing biochip is fabricated through the strong ZrOP bonds to form a clamp-type impedimetric aptasensor. It is demonstrated that the aptasensor could achieve Np detection in one step within 11 min and shows pronounced sensitivity with a detection limit of 0.31 pg mL–1. Above all, the aptasensor displays great specificity and stability under physiological conditions as well as various water environments. It is a potentially promising strategy to exploit reliable Ag-RDT products to confront the ongoing epidemic.