





## Plasmon-associated DNA genotyping based on crystalline assemblies of metallic carbon nanotubes

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Received 16 October 2023

Accepted 23 October 2023

Published 20 December 2023

Sensitivity and selectivity of modern electrochemical genotyping methods are insufficient to detect a single-oligonucleotide mismatch in low-concentration native DNA samples. Novel methods of tuning, controlling, and monitoring plasmon modes are necessary to achieve attomolar and higher sensitivity for the modern graphene-based transducers of molecular signals. The electrochemical DNA assay is promising one for applications in the molecular diagnostics of tumors with the genome single-nucleotide polymorphism (SNP) for simultaneously discriminating both wild-type and mutant alleles of the gene in very small concentrations. We offer the plasmon-associated DNA-genotyping method based on the screening effects in assemblies of Raman-optically active conjugates comprising DNA and metallic carbon nanotubes. The impedimetric DNA sensors of non-Faradaic type based on the plasmonic screening effect can be more sensitive than the Raman optical transducer based on Raman DNA optical activity resulting in the plasmon resonance due to liability of the Raman transducer parameters to environmental influence.

**Keywords:** DNA-carbon nanotube conjugates; crystalline assemblies of carbon nanotubes; KRAS gene polymorphism; Raman spectroscopy; DNA optical activity; non-Faradaic EIS.

### 1. Introduction

Nowadays, plasmonic and electrochemical DNA assays are promising ones for applications in the molecular diagnostics of tumors with genome single-nucleotide polymorphism (SNP). However, sensitivity and selectivity of modern genotyping electrochemical methods are low to detect allele SNP of cancer genome because of

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