Multiplexed DNA Detection via Amplification on Nanowires

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Arrays of distinct DNA markers that can selectively identify and bind specific viral DNA segments can potentially lead to the development of ultra-sensitive biosensors. Here, we show that these DNA markers can be assembled on selected Au wires within an array, leaving other wires bare. We also show that at least two different markers can be assembled on separate wires. In order to assemble DNA markers only on certain specified wires within a set, we first allow the DNA segments, modified with a thiol end group, to self-assemble onto the gold surface. We then remove the DNA from unwanted wires by applying a negative voltage to the gold surface that breaks the Au-S bond. By carrying out a series of assembly and removal steps, we hope to be able to assemble several distinct DNA markers on different wires in an array, which will ultimately allow us to detect the presence of a range of viruses in a given sample at once. The majority of our experiments have been carried out using Au wires that reach a minimum width of 5 μm at their narrowest point, but we hope to replicate our results using nanoarrays of Au wires that reach a minimum width of 100 nm.

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