Design and Analysis of Rapid Production Single Wall Carbon Nanotube Sensor Platforms

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Abstract

Single-wall carbon nanotubes (SWNT) have a strong and stable near-infrared (nIR) signal and can interact with target analytes selectively, even at the single molecule level, to alter fluorescence intensity and/or emission peak wavelength. SWNT have been employed as nIR optical sensors for detecting a variety of analytes. However, high cost, long fabrication time, and poor fluorescence yield limit the current methods for immobilizing SWNT sensors on solid substrates. Recently, our group reported a protocol for SWNT immobilization resulting in high fluorescence yield, signal longevity, fluorescence distribution, and quick sensing response time. However, it takes 5 days to fabricate these sensor arrays. We have improved our previously reported protocol to immobilize SWNT sensors with a method that takes only 2 days, results in a platform with similar surface morphology, and has a higher fluorescence intensity than the previous platforms without sacrificing the sensing capabilities.