Abstract Submitted
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Systematic decay of Raman signal on DNA Origami-based SERS substrates: analysis of the hot spots[1] MAURICIO PILO-PAIS, ANNE WATSON, STEVEN DEMERS, Duke University, THOM LABEAN, North Carolina State University, GLEB FINKELSTEIN, Duke University — We studied the decay of Raman signal measured on self-assembled DNA origami-based substrates. Specifically, a rectangular origami ($\sim$ 70x90nm^2) was used to selectively attach gold nanoparticles ($\sim$ 5 nm) onto its corners, which were subsequently enlarged using a solution-based silver deposition. Further, 4-aminobenzenethiol (ABT) molecules were covalently attached to the assemblies. The assemblies were engineered to form "hot spots" of enhanced electromagnetic field between the nanoparticles, resulting in a significant enhancement of Raman signal compared to ABT molecules attached to individual nanoparticles. The signal systematically decayed as a function of the laser exposure time. The one-particle control samples showed no bleaching. We explain this behavior by the bleaching of the molecules due to the high intensity of the electric field at the hot spots. We further increased the laser intensity, allowing us to progressively burn molecules located in the regions within the hot spots where the field intensity exceeded the critical value. The analysis of the signal decay allow us to analyze the field enhancement in the hot spots and quantify the effectiveness of the DNA-origami-based SERS substrates.

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