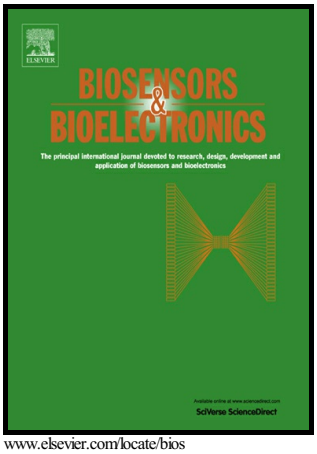

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Label-Free Distinction between p53+/+ and p53 -/- Colon Cancer Cells Using a Graphene Based SERS Platform

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Abstract:

Surface-Enhanced Raman Scattering (SERS) is used to differentiate two colon cancer cell line HCT 116, that is, to distinguish a TP53 gene knockout cell line (p53 -/-) from a wild type (p53 +/+). A label-free graphene/gold nanopyramid based SERS platform, combined with the multivariate analysis: principal component analysis, is used to profile live, dead, and burst colon cancer cells suspended in simulated body fluid (SBF). The graphene sheet permits SERS hotspot identification and provides a chemical enhancement for the biological constituents. This study found that a unique fingerprint exists for three different states of the cell, burst, live, and dead, which were used to differentiate the p53 +/+ and p53 -/- cell lines. Perceptron with Pocket Algorithm was also coupled with PCA to demonstrate an average of 81% sensitivity and 97% specificity in separating the two cell lines. The demonstration of single gene differentiation shows the great applicable potential of this SERS graphene hybrid platform for cancer diagnosis.

Keywords: Graphene, SERS, Colon, Cancer, Label-Free, p53

1. Introduction