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Surface enhanced raman spectroscopy on polymer-graphene oxide scaffolds for drug screening applications

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Abstract

Surface enhanced Raman spectroscopy (SERS) has evolved to be a powerful analytical tool for investigating molecular properties of various types of samples. Literature has shown SERS capabilities in both qualitative and quantitative analysis of biomolecules like proteins and DNA as well as single molecules like antiretroviral medication. Central to its application is the synthesis and use of sensing platforms that enhance signal intensity, sensitivity and detection limits. The most popular approach to make such platforms is through fabricating thin film substrates using a combination of polymers and nanomaterials. In this work, we use the self-assembly method to synthesize graphene oxide based scaffolds in a layer-by-layer fashion and characterize them using SERS. The results show a clear difference in Raman spectral fingerprint for the different layers during the self-assembly steps. Lastly, the intensity ratio between the D and G bands of the graphene layer were calculated to measure the layer thickness which was found to be 0.65, this was comparable to thin layer scaffolds reported in literature. Future work will involve the use of atomic force microscopy to confirm surface morphology and layer thickness, followed by screening of antiretroviral medication.