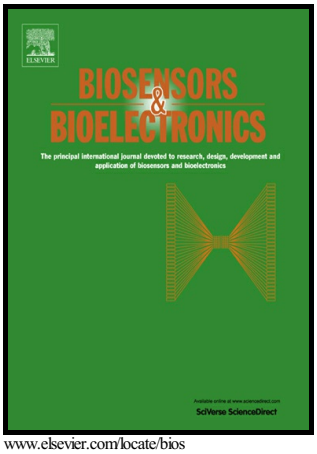

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Veeradasan Perumal[1], Mohamed Shuaib Mohamed Saheed[1,2], Norani Muti Mohamed[1,2,*], Mohamed Salleh Mohamed Saheed[1,2], Satisvar Sundera Murthe[1,2], Subash C.B. Gopinath[3,4], Jian-Ming Chiu[5,6]

[1]Centre of Innovative Nanostructures and Nanodevices (COINN), Universiti Teknologi PETRONAS, 32610 Seri Iskandar, Perak Darul Ridzuan, Malaysia.
[2]Department of Fundamental and Applied Sciences, Universiti Teknologi PETRONAS, 32610 Seri Iskandar, Perak Darul Ridzuan, Malaysia.
[3]Institute of Nano Electronic Engineering, Universiti Malaysia Perlis, 01000 Kangar, Perlis, Malaysia.
[4]School of Bioprocess Engineering, Universiti Malaysia Perlis, 02600 Arau, Perlis, Malaysia.
[5]Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei 10617, Taiwan
[6]Department of Chemical Engineering, National Taiwan University of Science and Technology, Taipei 10607, Taiwan
* noranimuti_mohamed@utp.edu.my

ABSTRACT

Tuberculosis (TB) is a chronic and infectious airborne disease which requires a diagnosing system with high sensitivity and specificity. However, the traditional gold standard method for TB detection remains unreliable with low specificity and sensitivity. Nanostructured composite materials coupled with impedimetric sensing utilised in this study offered a feasible solution. Herein, novel gold (Au) nanorods were synthesised on 3D graphene grown by chemical vapour deposition. The irregularly spaced and rippled morphology of 3D graphene provided a path for Au nanoparticles to self-assemble and form rod-like structures on the surface of the 3D graphene. The formation of Au nanorods were showcased through scanning electron microscopy which revealed the evolution of Au nanoparticle into Au islets. Eventually, it formed nanorods possessing lengths of ~150 nm and diameters of ~30 nm. The X-ray diffractogram displayed appropriate peaks suitable to defect-free and high crystalline graphene with face centred cubic Au. The strong optical interrelation between Au nanorod and 3D graphene was elucidated by Raman spectroscopy analysis. Furthermore, the anchored Au nanorods on 3D graphene nanocomposite enables feasible bio-capturing on the exposed Au surface on defect free graphene. The impedimetric sensing of DNA