Electronic Supplementary Material (ESI) for Analytical Methods.

Homogeneous surface-enhanced Raman scattering platform for ultra-trace detection of trinitrotoluene in environment

Arniza K. M. Jamil[a], Emad L. Izake[a]*, Arumugam Sivanesan[a]*, Roland Agoston[a], Godwin A. Ayoko[a]

[a] Nanotechnology and Molecular Sciences Discipline, Faculty of Science and Engineering, Queensland University of Technology, 2 George St., Brisbane, QLD 4001, Australia.

A.S. and A.K.M.J contributed equally to the manuscript

*Corresponding authors:

E-mail address: sivanesan.arumugam@qut.edu.au; asnesan@gmail.com (A. Sivanesan) Tel: +61 07 3138 0607

E-mail address: e.kiriakous@qut.edu.au (E. L. Izake) Tel.: +61 7 3138 2501; Fax: +61 7 3138 1804

Calculation of laser sport size

The simplified equation to calculate the diameter of the focused laser spot is

$$S = 0.61\lambda / NA$$

The above equation is extracted from Renishaw notes of the Spectroscopy Products Division;

SPD/PN/088 Issue 1.1 June 2003)

here S = diameter of laser spot size (beam diameter)

λ = wavelength of the laser beam which is 785 nm in the present study

NA = Numerical aperture

50 x objective

NA = 0.75 (Renishaw standard)

Spot size, S = 0.61x 0.785 /0.75 = 0.64 μm

Radius = 0.32 μm

Illuminated area = 0.32x0.32 x3.14 = 0.32 μm^2

5 x objective

NA = 0.12 (Renishaw standard)

Spot size S= 0.61 x 0.785/ 0.12 = 3.99 μm

Radius = 2 μm

ılluminated area = 2 x2x 3.14=12.56 μm^2

Therefore the illuminated area by the 5 x objective is **39.25** times larger than the 50 x objective

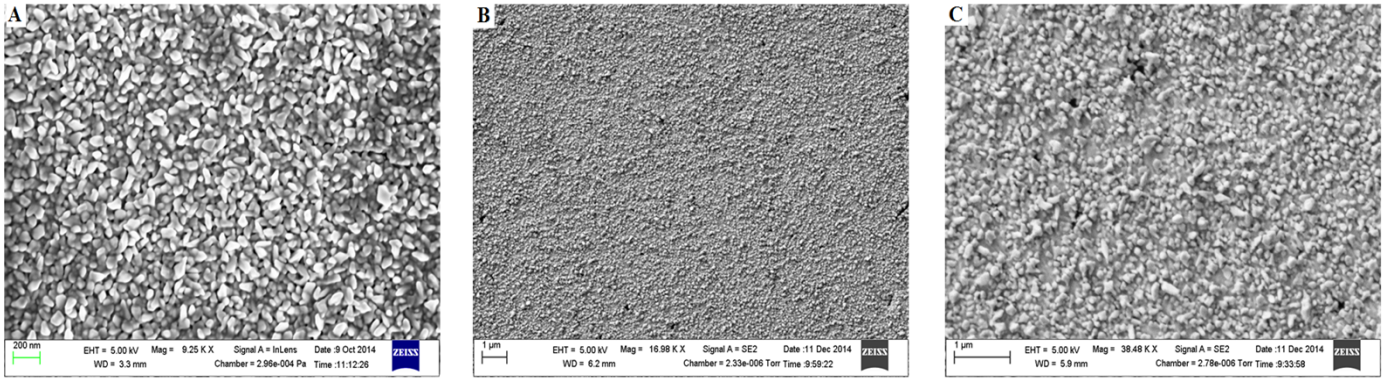

Fig. S1 SEM images of pAu/AuNS substrates prepared at (A) -20 Mv, -150 mV and 300Mv respectively.

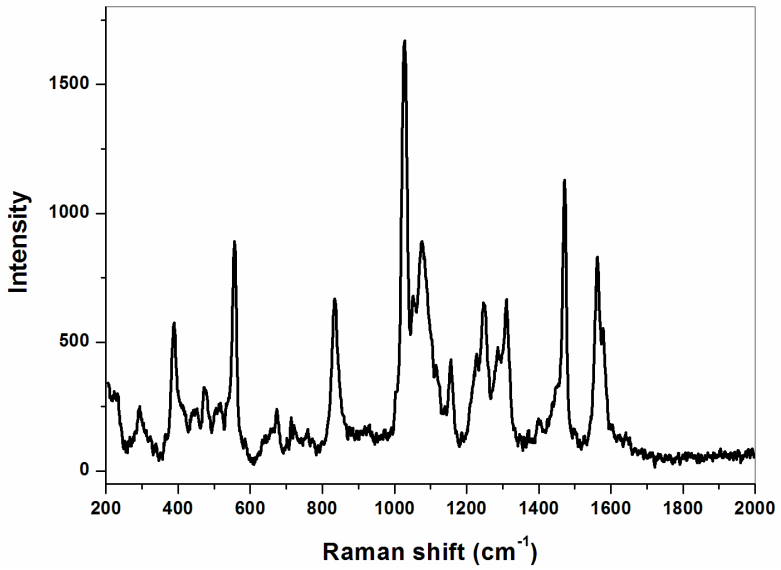

Fig. S2 Monolayer SERS spectrum of 10^{-5} M cysteamine on pAu/AuNS surfaces

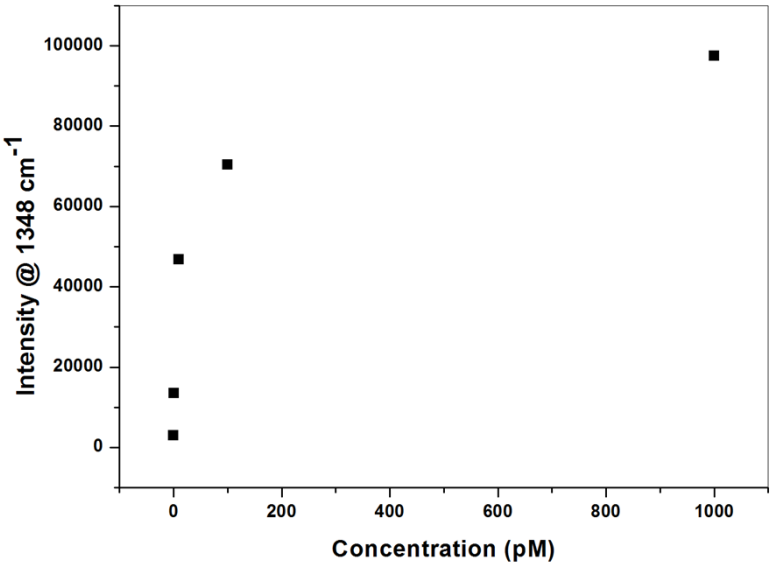

Fig. S3 Plot demonstrating relation between the concentration of TNT and Raman intensity @1348 cm^{-1}