

Supplementary Information

Controlled Nanofabrication of Metal Free SERS Substrate on Few Layer Black Phosphorus by Low Power Focused Laser Irradiation

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1. Measurement of laser beam diameter by analyzing the beam profile:

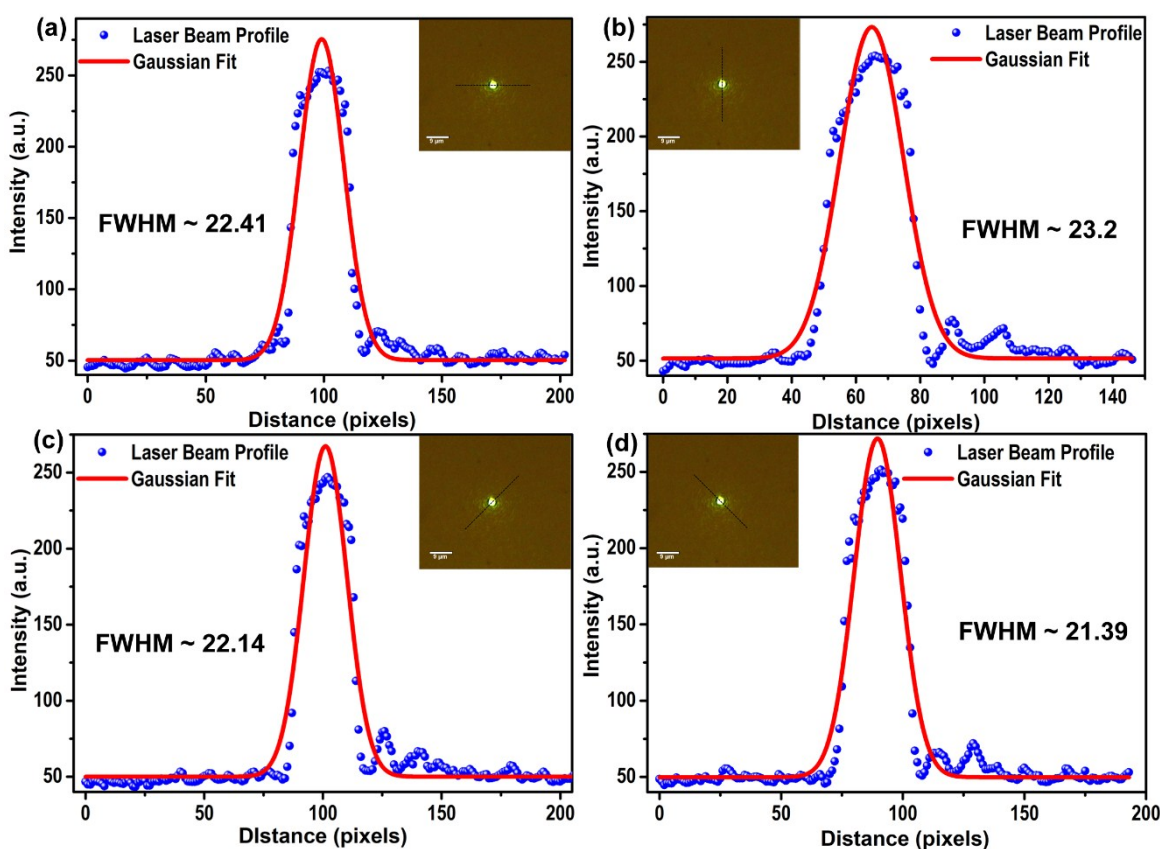


Figure S1: Laser beam intensity profile to calculate the beam diameter. Inset shows the reflected optical image of the beam intensity focused using 100X objective. The beam profile has been extracted along directions shown by black lines in the optical images. Average FWHM ~ 22.12 pixels, which corresponds to ~ 0.995 μm .

2. Measurement of the 532 nm laser power before and after the objective (100X); the laser power measured after the objective has been used to calculate the laser power density:

Before objective (mW)	After objective (mW)	Power Density (x 10⁵ W/cm²)
5	2.46	3.1
10	4.71	6.3
15	7.37	9.4
20	9.85	12.5
25	12.32	15.6
30	14.77	18.7
35	17.2	21.8
40	19.7	23.7

Supplementary Table 1: Measured laser power before and after the objective and corresponding power density.

3. Raman spectra of the BP flake at pristine and nano-void position:

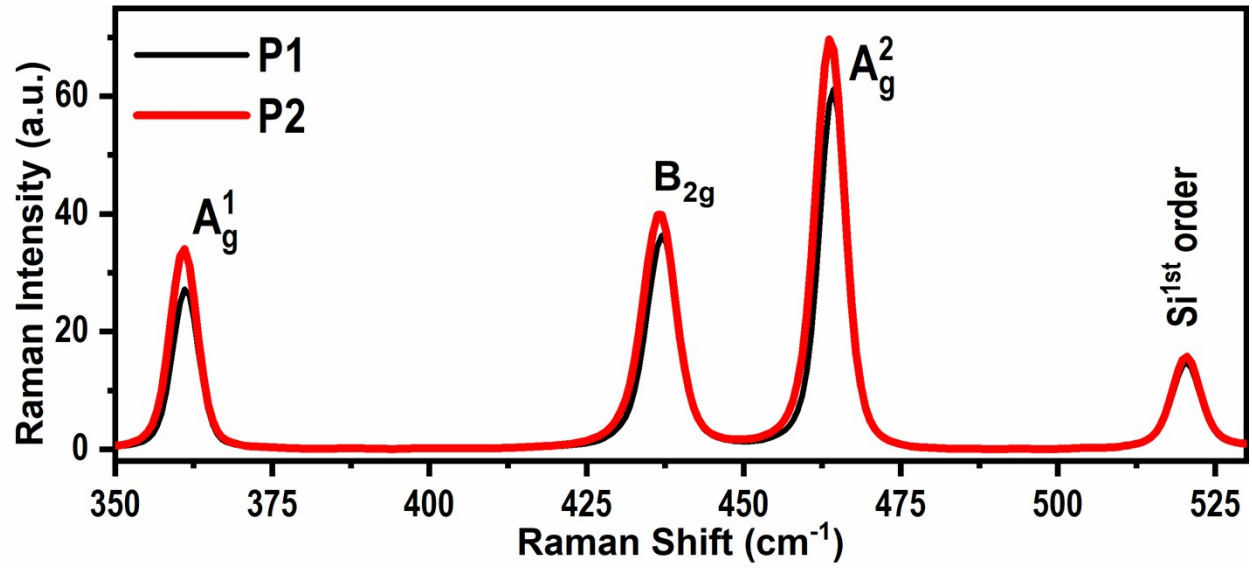


Figure S3: A comparative Raman spectra on pristine area and at nano-void position of the patterned BP flake.

4. Raman spectra of Rhodamine B (RhB) with different acquisition time:

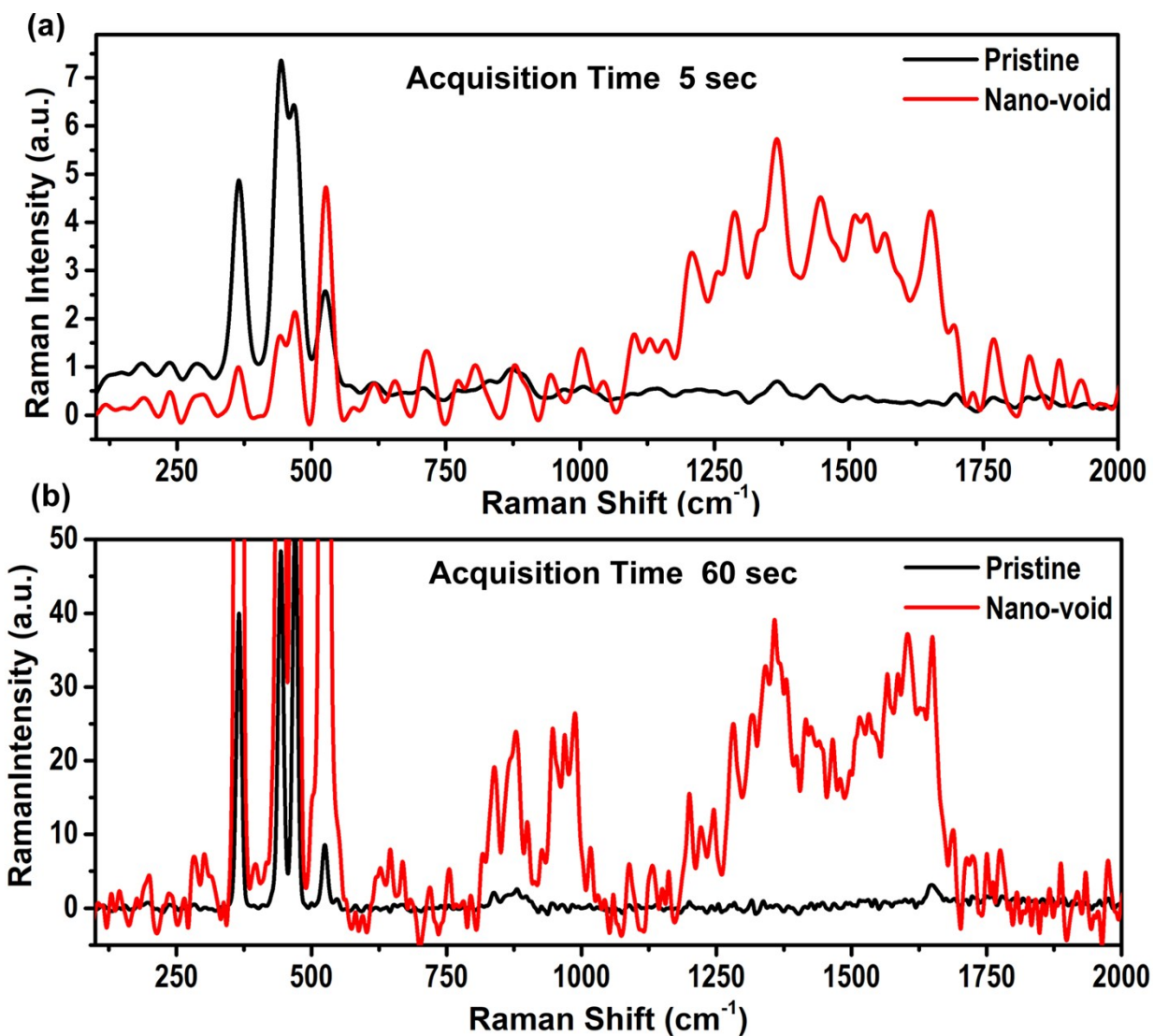


Figure S4: Raman spectra of 1000 nM RhB molecule, drop casted on the fabricated SERS substrate with different acquisition time (a) 5 sec and (b) 60 sec.

5. Deconvoluted spectra of RhB for different concentration:

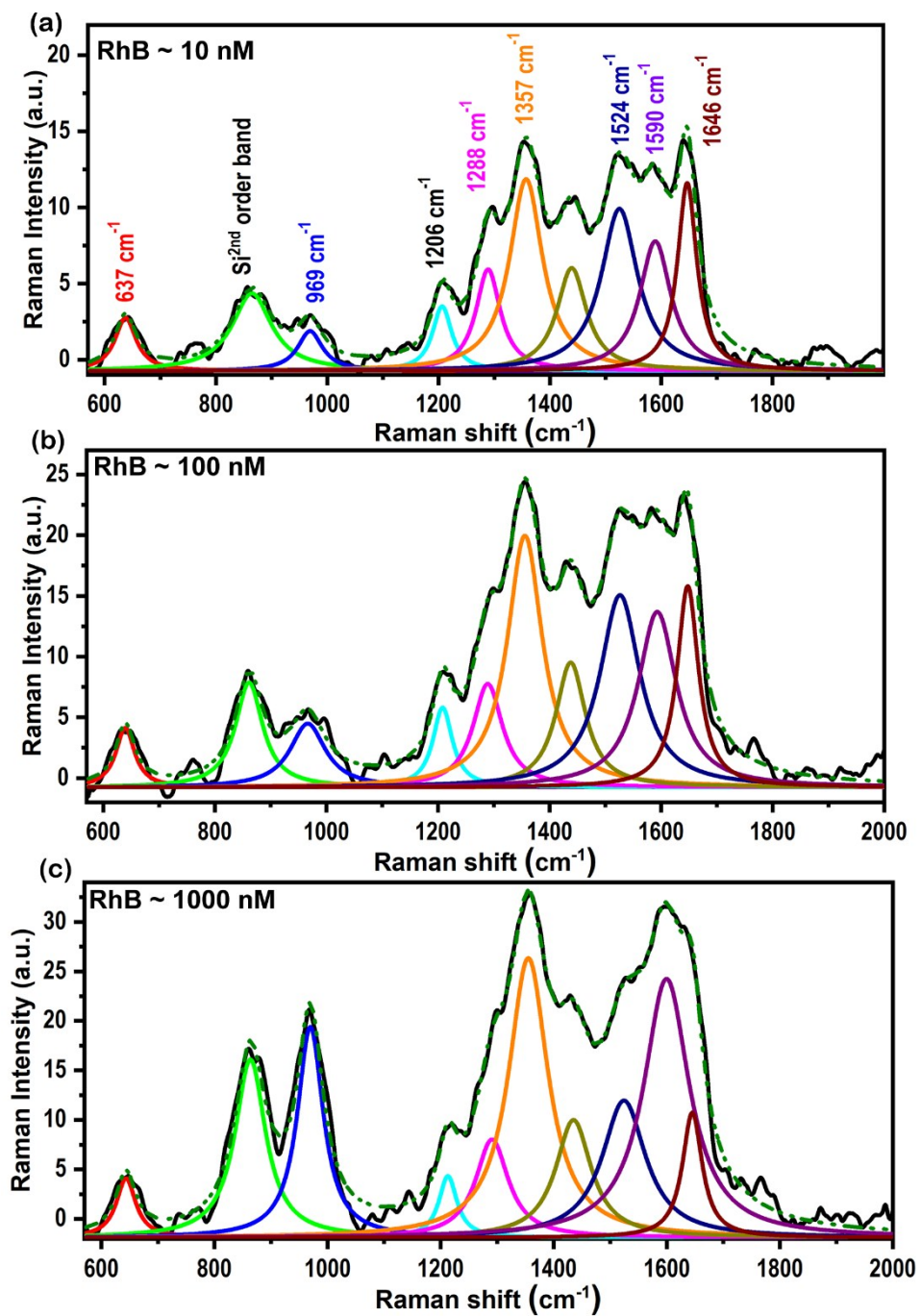


Figure S4 De-convoluted Raman spectra of Rhodamine B (RhB) for different concentration (a) 1000 nM, (b) 100 nM and (c) 10nM.