Supporting Information:

Fried egg-like Au mesostructures grown on poly(4-vinylpyridine) brushes grafted graphene oxide

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**Figure S1.** Raman spectra of 4-ATP ($10^{-4}$M) on the different Au nanostructures: (a) SEM image of the sample shown in Fig.2A; (b) SEM image of the sample shown in Fig.2B; (c) SEM image of the sample shown in Fig.2C; (d) SEM image of the sample shown in Fig.2D;
The calculation of EF value:

The value of the surface enhancement factor (EF) of 4-ATP on fried egg-like Au mesostructures is calculated according to the following expression: $EF = \frac{I_{SERS}}{I_{bulk}} \times \frac{N_{bulk}}{N_{ads}}$, where $I_{SERS}$ is the intensity of a vibrational mode in the SERS spectrum of 4-ATP and $I_{bulk}$ is the intensity of the same mode in the Raman spectrum from the solid 4-ATP. For all spectra, the intensity of $\nu_{cs}$ at 1079 cm$^{-1}$ is used to calculate EF values. $N_{bulk}$ is the numbers of molecules of the neat 4-ATP in the laser illumination volume assuming a cylindrical focal volume (the diameter of the laser spot is 1 μm and the depth of the laser is 2 μm). Then, $N_{bulk}$ is calculated by $N_{av}(\rho V_{laser}/M)$, in which $N_{av}$ is the Avogadro number, $V_{laser}$ is the focal volume of the laser illumination, $M$ is the molecular weight of 4-ATP molecule (125.19 g mol$^{-1}$), and $\rho$ is the density of 4-ATP molecule (1.18 g cm$^{-3}$). So, $N_{bulk}$ is 8.91x10$^9$ molecules. If we assume the Au mesostructures as a compact flat surface, and 4-ATP is dispersed on Au mesostructures with dense monolayer coverage, then the density of 4-ATP is assumed to be 10$^{-4}$ M×50μL×$N_{av}$/cm$^2$ (i.e., 3.01x10$^{15}$/cm$^2$). Because the surface area of the laser spot (1 μm diameter) is about 7.85x10$^{-9}$ cm$^{-2}$, the number of adsorbed molecules within the laser spot is 2.36 $\times$10$^7$. The ratio of $N_{bulk}$ to $N_{ads}$ is about 3.78$\times$10$^2$. The ratio of $I_{SERS}$ to $I_{bulk}$ is about 100 according to Figure S2. Therefore, EF is calculated to be about 3.78$\times$10$^4$. 

Figure S2. (a): Raman spectrum of 4-ATP (10^{-4} M) on fired egg-like Au mesostructures (SEM image of the sample shown in Fig.3D); (b): Raman spectrum of the solid 4-ATP.

Reference