Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information for

Silver Embedded Nanostars for SERS with Internal Reference (SENSIR)

Andrew M. Fales[a,b] and Tuan Vo-Dinh[a,b,c,*]

[a.] *Fitzpatrick Institute for Photonics, Duke University, Durham, North Carolina 27708, USA*
[b.] *Department of Biomedical Engineering, Duke University, Durham, North Carolina 27708, USA*
[c.] *Department of Chemistry, Duke University, Durham, North Carolina 27708, USA*

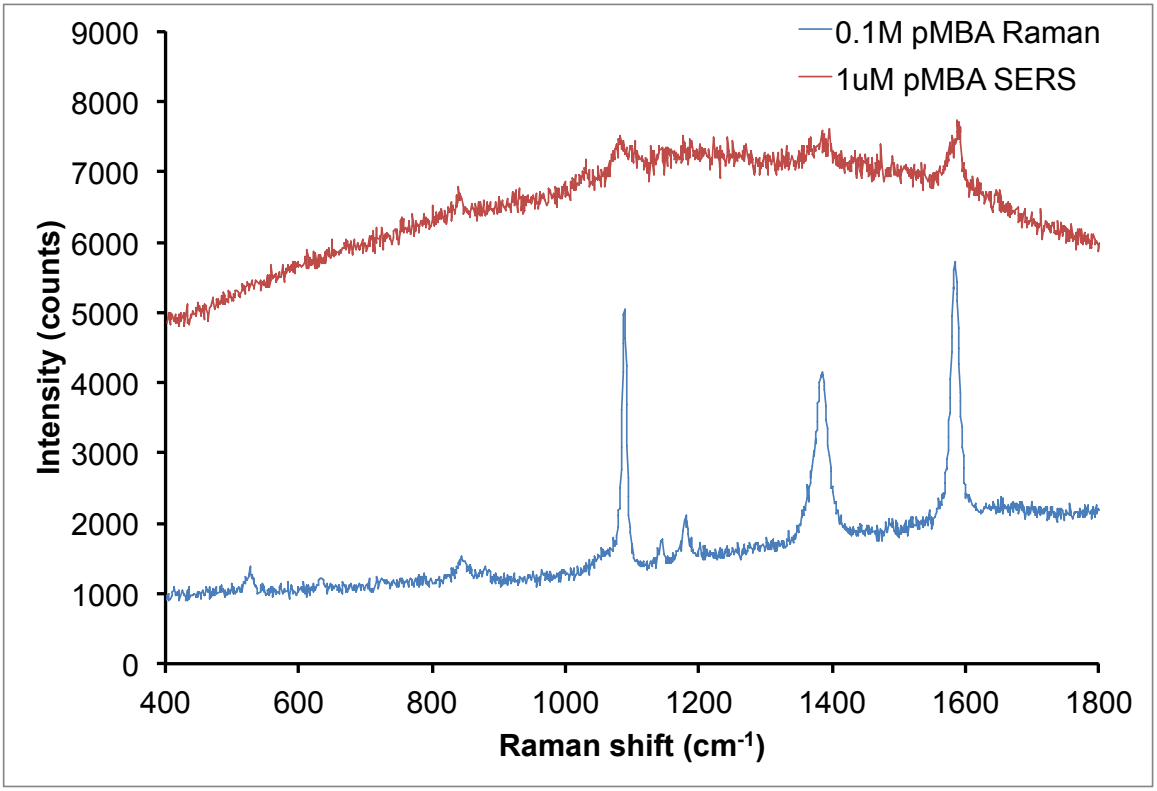

Figure S1. The Raman spectrum of 0.1 M pMBA in 1 M NaOH, along with the SERS spectrum from 1 µM pMBA on AuNS@Ag particles. Spectra have been offset for clarity.

SERS enhancement factor calculation:

$$EF = \frac{I_{SERS} \times C_{Raman}}{I_{Raman} \times C_{SERS}}$$

The 1583 cm^{-1} peak of pMBA was integrated for the 0.1 M pMBA Raman spectrum, the 1 µM pMBA on AuNS@Ag5 SERS spectrum, and SERS signal from 1 µM pMBA embedded in AuNS-pMBA@Ag5, after background subtraction. The exterior enhancement factor was found to be $4.1 \pm 0.2 \times 10^4$, with an interior enhancement factor of $4.2 \pm 0.2 \times 10^6$.

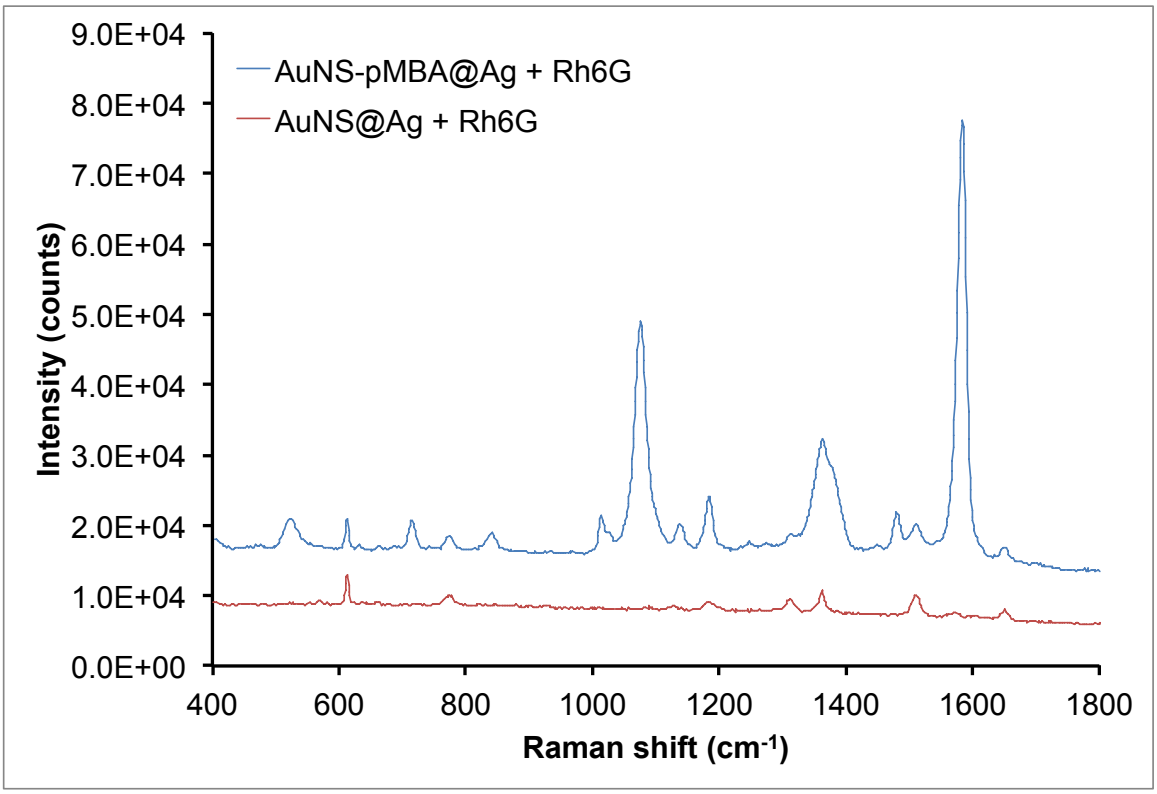

Figure S2. The SERS spectra of 10 µM Rh6G on SENSIR particles (blue), and silver-coated gold nanostars without the embedded internal reference (red). Spectra have been offset for clarity.

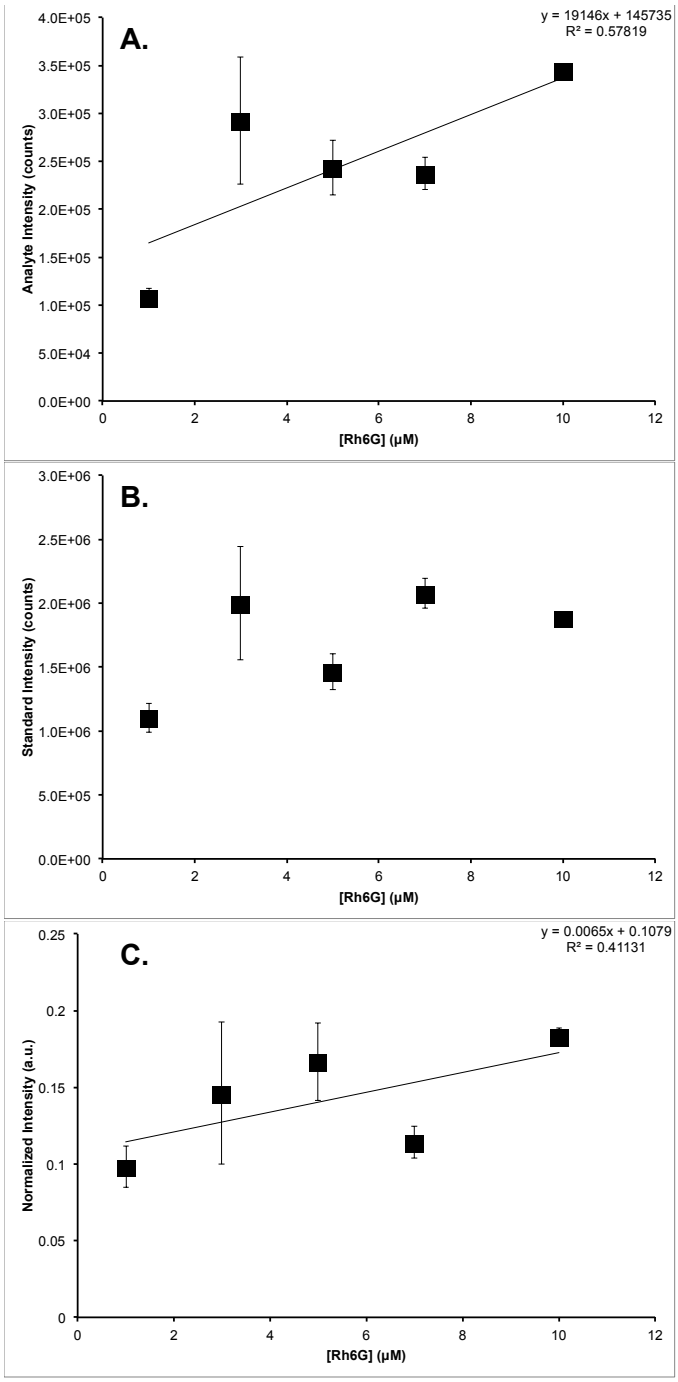

Figure S3. (A) Integrated Rh6G signal intensity, (B) Integrated pMBA signal intensity, (C) pMBA normalized Rh6G signal at different concentrations of Rh6G on AuNP@Ag.

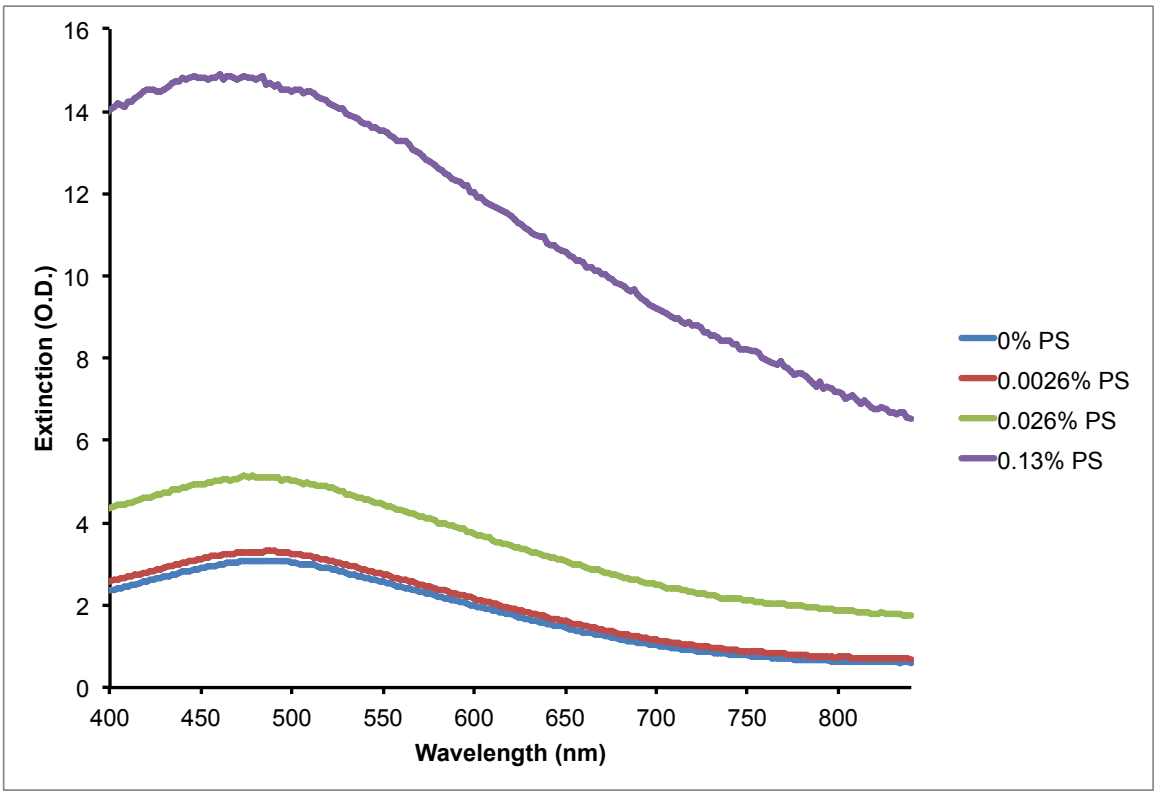

Figure S4. Extinction spectra of 1µm polystyrene beads in water at the designated %(w/v).