

Supporting Information

Metal Nanoinks as Chemically Stable Surface Enhanced Scattering (SERS) Probes for Analysis of Blue BIC Ballpoint Pens

Abeer Alyami, Daniela Saviello, Micheal A. P. McAuliffe, Antonio Mirabile, Liam Lewis, Daniela Iacopino*

Raman/SERS spectra of blue and purple spots

Figure S1 shows Raman and purple Raman and SERS spectra of the blue and purple spots taken at 514 nm and 785 nm. Specifically, Figure S1a shows the amplification of 2 orders of magnitude of the blue spot signals obtained for SERS with Ag NIs compared to NR and SERS with Au Nis at 514 nm laser illumination. This amplification was due to EM enhancement effects. Figure S1b shows the amplification of 1 order of magnitude of the purple spot signals obtained for SERS with Ag NIs compared to NR and SERS with Au NIs at 514 nm laser illumination. This enhancement was ascribed to electromagnetic and charge transfer effects. Evidence of the charge transfer effect occurring is shown by the red shift of the frequencies of SERS Ag NIs compared to NR and SERS Au NIs. Specifically, the N-phenyl frequencies appearing at 1371 cm^{-1} and 1386 cm^{-1} in the NR spectrum were shifted to 1376 cm^{-1} and 1393 cm^{-1} , respectively in the SERS spectrum. Also the C=C ring frequency was shifted from 1619 cm^{-1} to 1627 cm^{-1} . Also, the asymmetric modes *e* were enhanced compared to the symmetric modes. Figure S1c shows the enhancement of the blue spot signals obtained for SERS with Au NIs compared to NR and SERS with Ag NIs at 785 nm laser illumination. This enhancement was due to electromagnetic effects and charge transfer processes, highlighted by the formation of additional

peaks of symmetry a_{2g} . Figure S1d shows the enhancement of the purple spot signals obtained for SERS with Au NIs compared to NR and SERS with Ag NIs at 785 nm laser illumination. At these experimental conditions the enhancement was ascribed solely to a charge transfer effect.

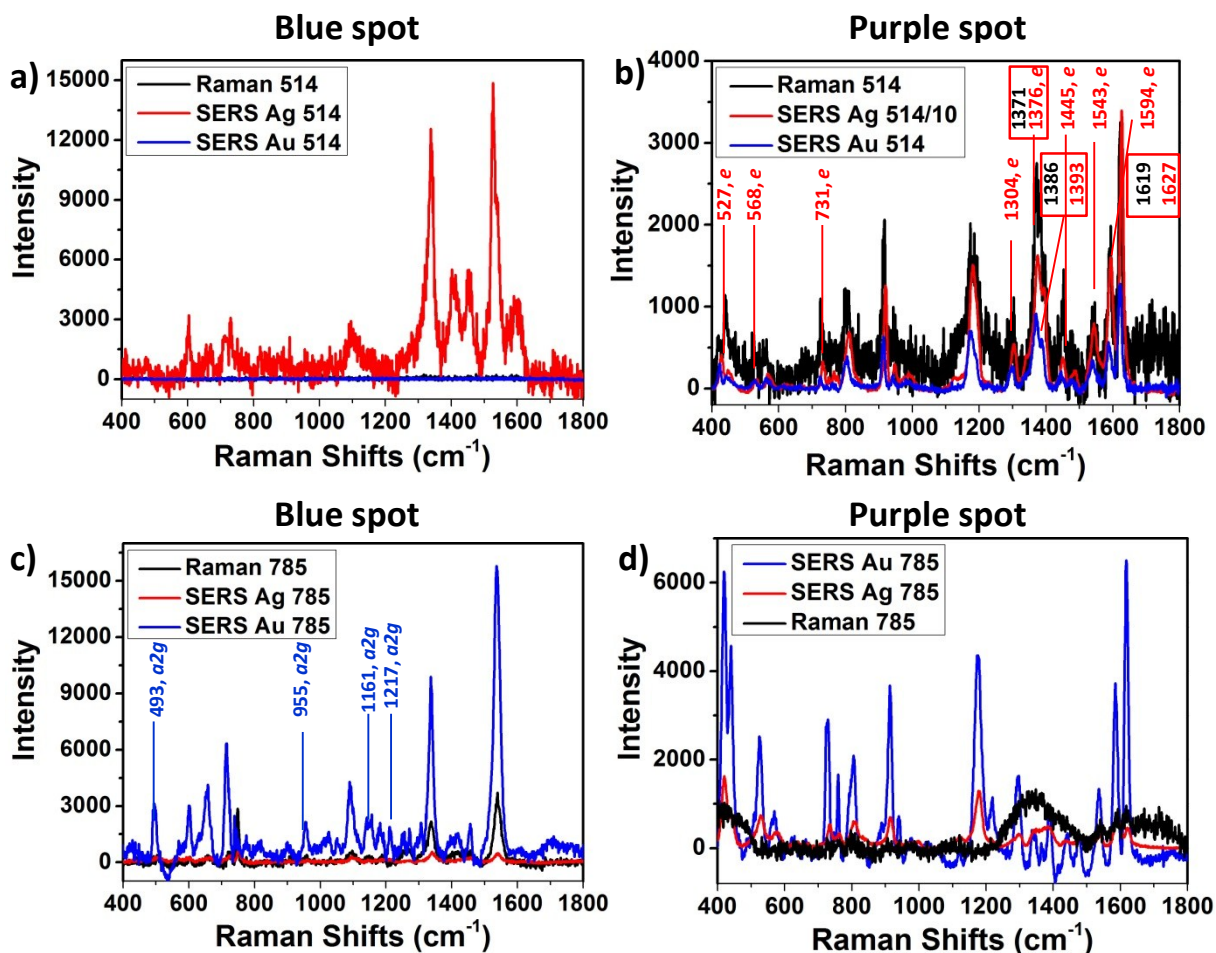


Figure S1: Raman, SERS with Ag NIs and SERS with Au NIs recorded with 514 nm illumination for a) blue spot and b) purple spot; Raman, SERS with Ag NIs and SERS with Au NIs recorded with 785 nm illumination for a) blue spot and b) purple spot.