# Supporting Information

Direct Experimental Observation of Salt Induced Aspect Ratio Tunable PFPT Silver-Nanowire Formation: SERS-based *ppt* Level $Hg^{2+}$ Sensing from Ground Water

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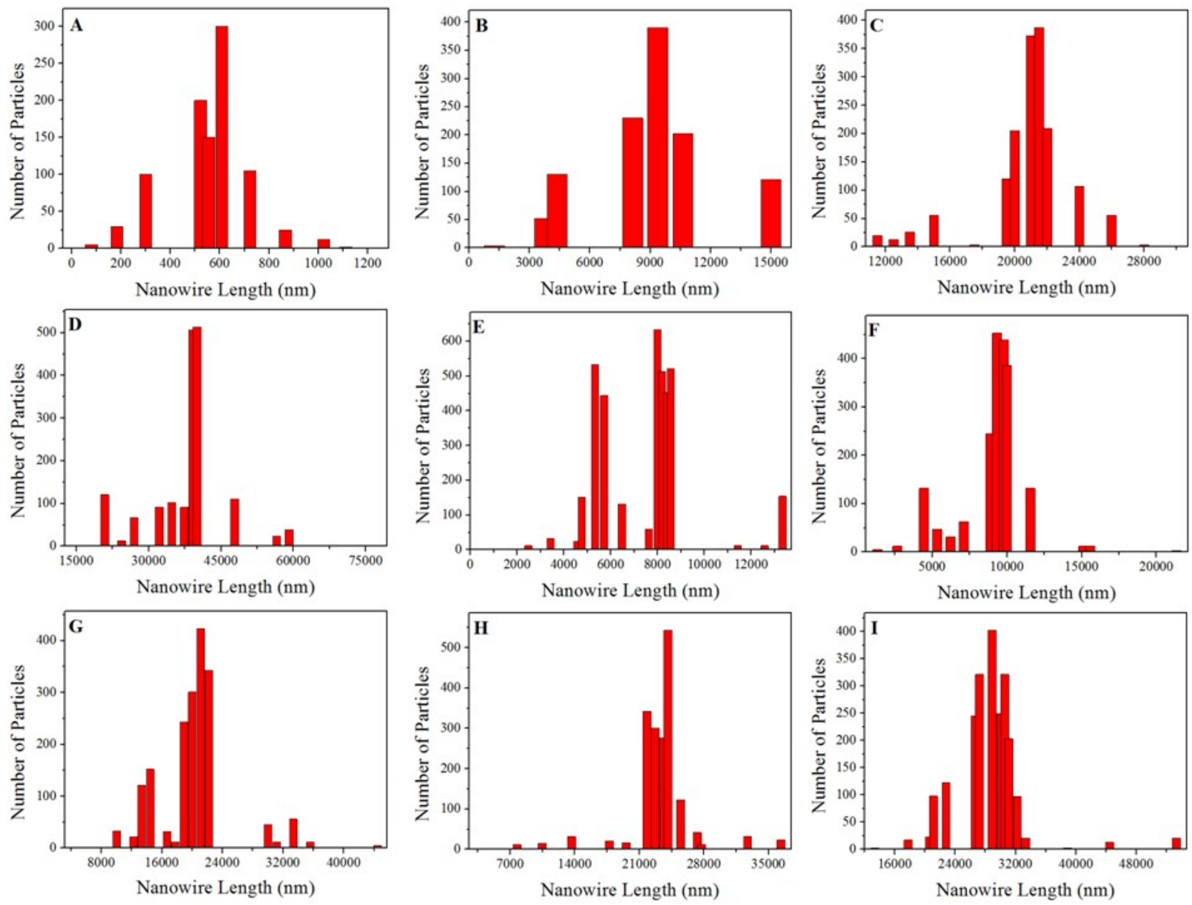


**Figure SI1:** Quantification of aspect ratio of the synthesized nanowires by varying the concentration of added salt. We have considered 10 or more image frames with each frame having more than 100 nanoparticles for individual nanowires synthesized at different concentration of salt . Measurement shows the number averaged length distribution (X axis: length of silver nanowire and Y axis: number of nanowires at that particular length) which corresponds to the estimated average length (ensemble average) as reported their mean length in **Figure 1 & 2** of the main text. From A-I we have added 1mL, 2mL, 3mL, 4mL, 8mL, 16mL, 32mL, 50mL, and 64mL of 2.7mM NaCl.

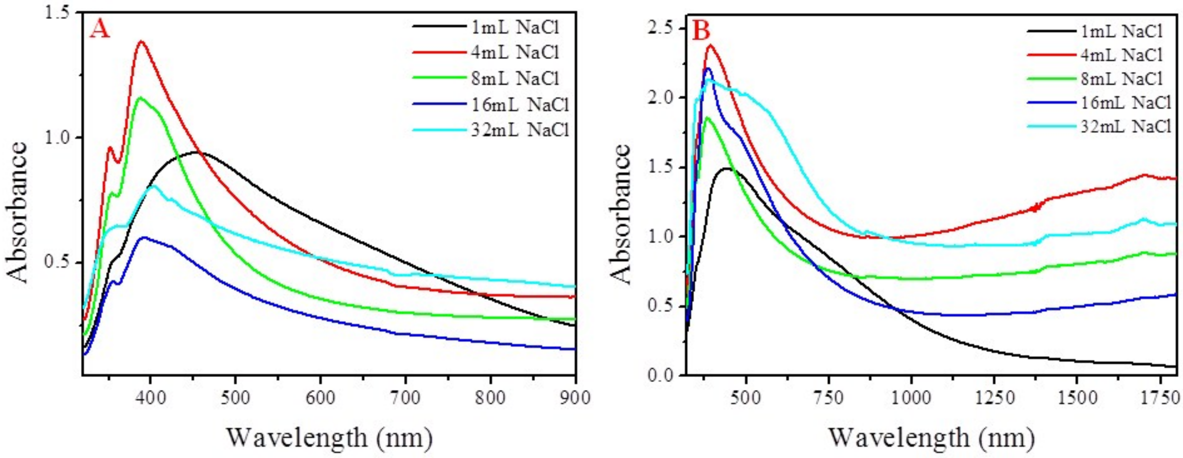


**Figure SI2:** UV-Vis and Vis-NIR absorption spectra of NaCl induced nanowires. Amount of NaCl varies between 1mL-32mL. NIR absorption spectra beyond 1750nm was completely quenched due to strong absorption by EG and not presented in this figure.

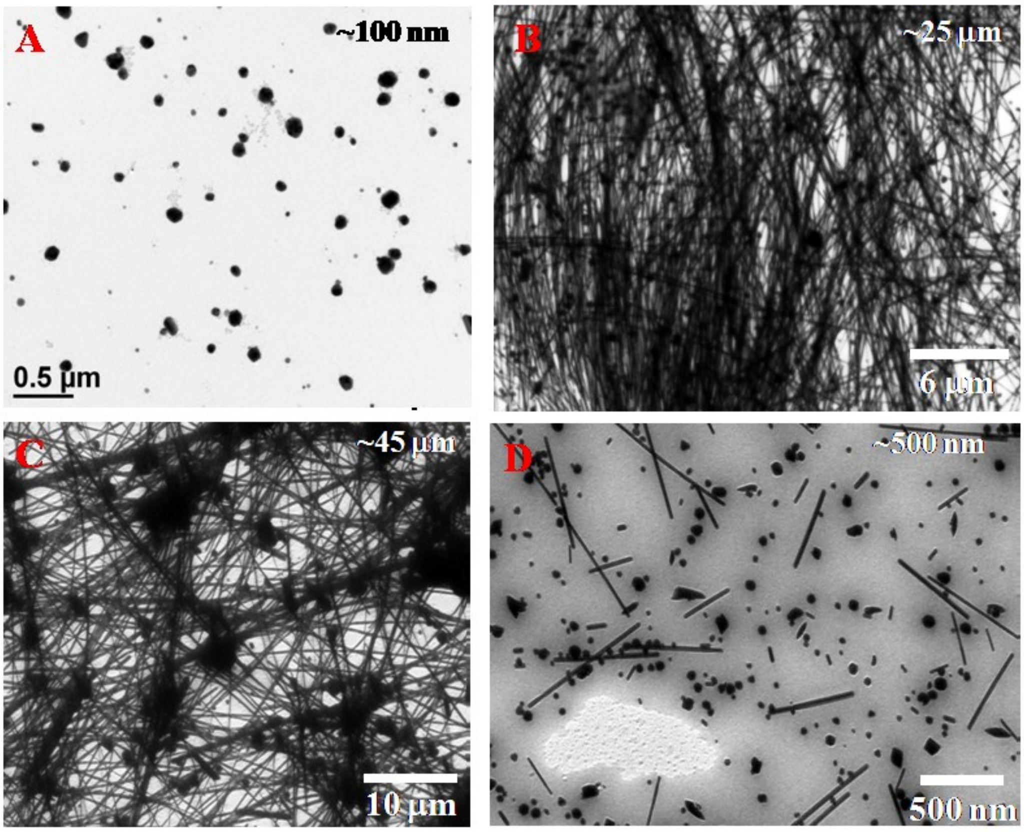


**Figure SI3:** Efficiency of generating high quality (HQ) nano-wire based on the electronegativity of the halide in the common salts. Where (A) NaF-based Ag-nano sphere, (B) NaCl-based Ag-nano wire, (C) NaBr-based Ag-nano wire, and (D) NaI-based Ag-nano sphere/wire indicates their relative efficiency to generate high aspect ratio nanowires.

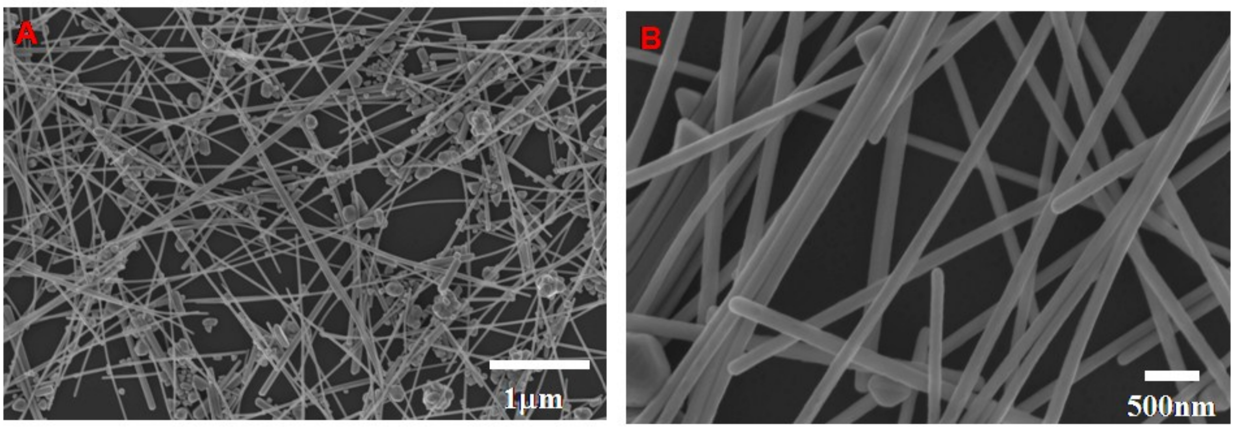


**Figure SI4:** Sonication cum fractional centrifugation technique to remove the spheroids and obtain purified silver nanowires. Improvement of wire quality (A) before and (B) after sonication cum fractional centrifugation.

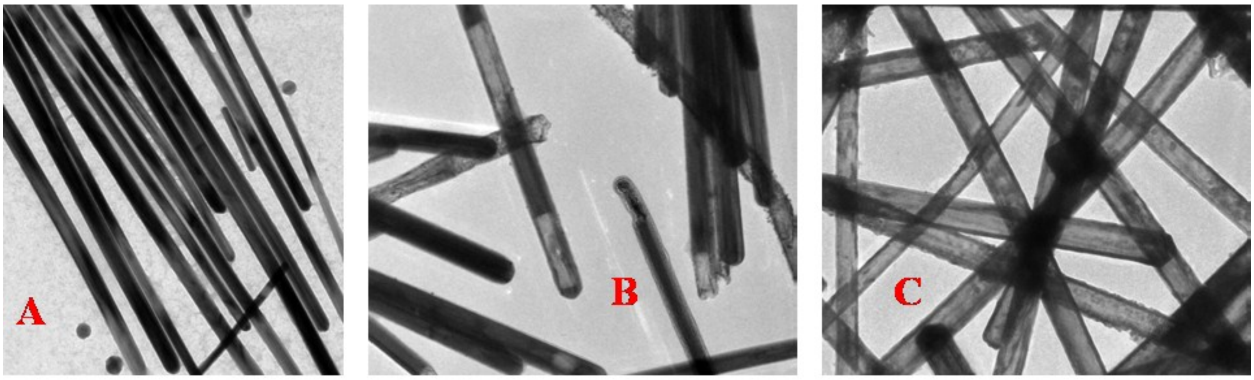


**Figure SI5:** Controlled generation of hollow nanotubes. A: Without gold leaching, B: Less leaching, and C: More leaching.

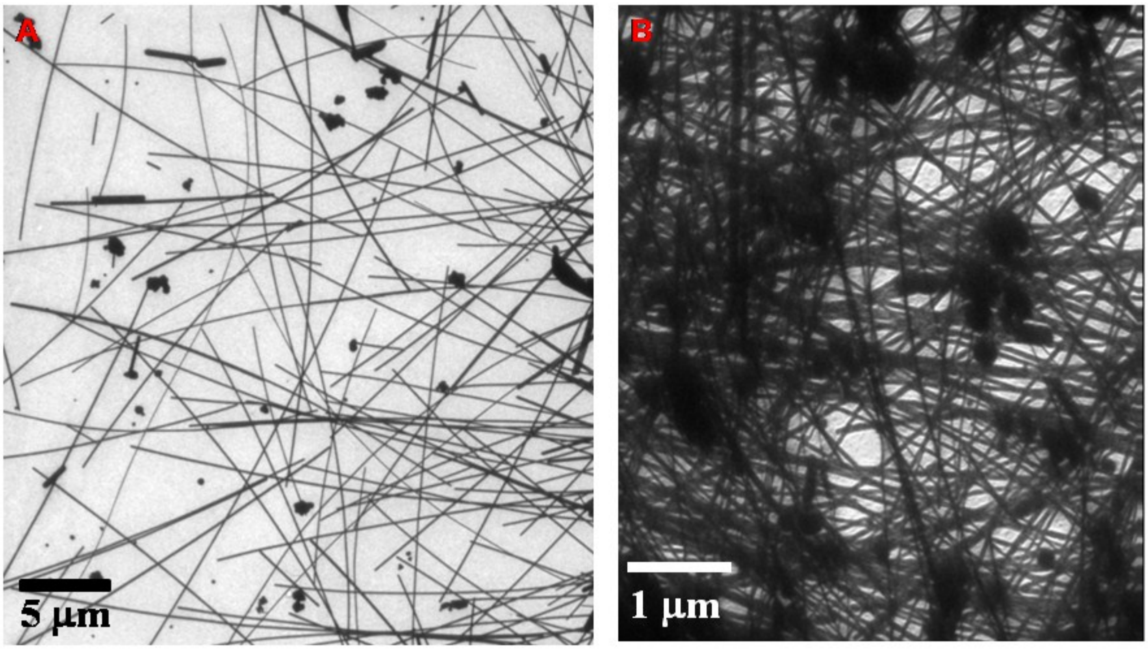


**Figure SI6:** The effect of dithiothreitol addition in the reaction mixture when the synthesis was performed (A) without DTT, and (B) with DTT.

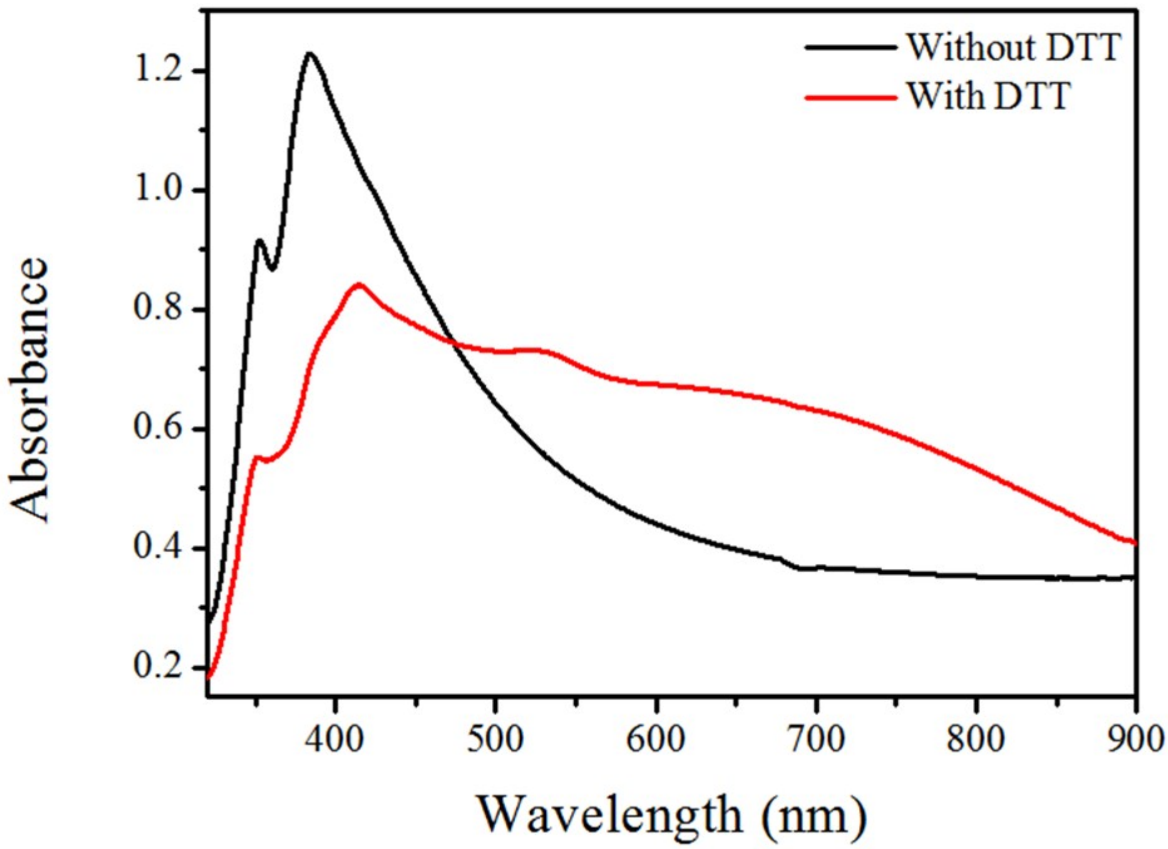


**Figure SI7:** UV-Vis absorption spectral comparison of silver nanowires synthesized in absence (Black) and in presence (Red) of DTT (dithiothreitol).

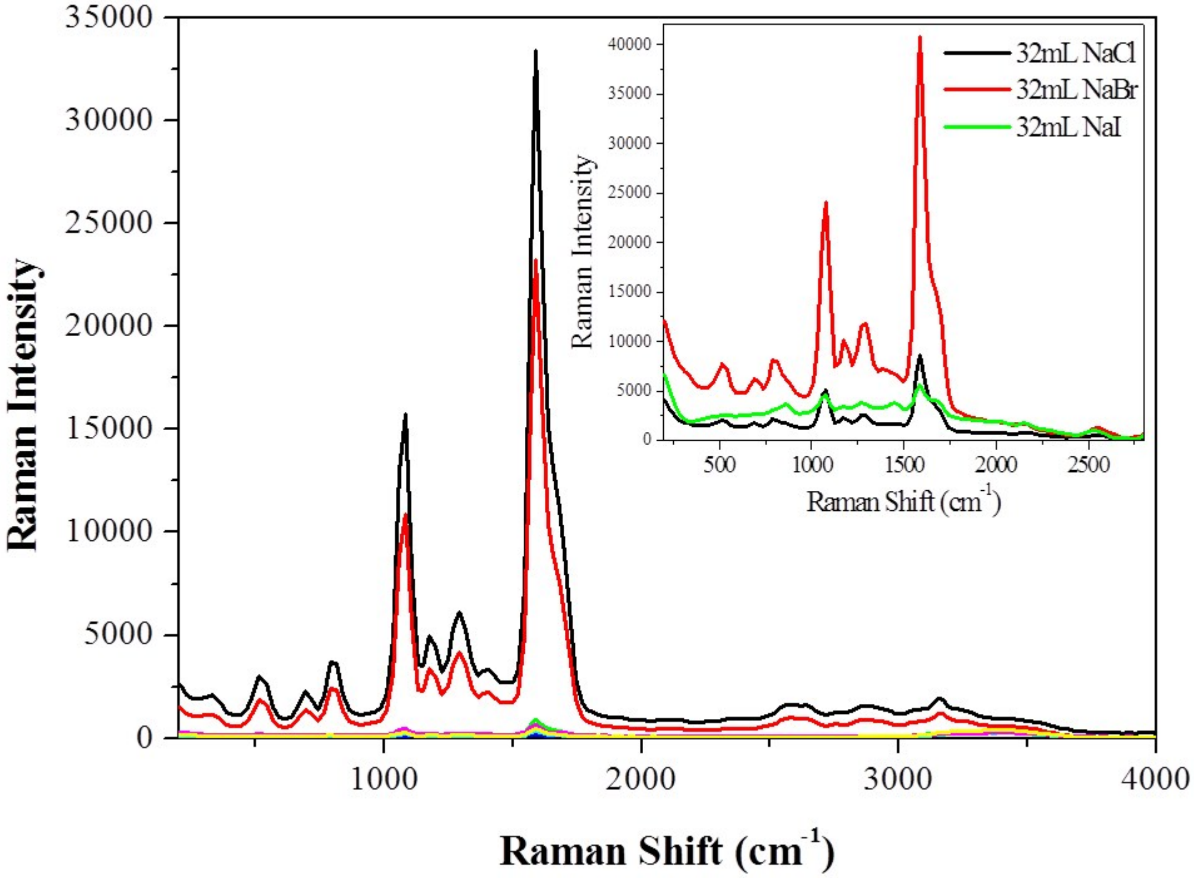


**Figure SI8:** Variation of Raman intensity of the surface adsorbed 4-MBA on different aspect ratio SNW. Different spectra indicates the nanostructures obtained by using different amount of 2.7mM NaCl in the reaction mixture. Black: 250µL, Red: 750µL, Green: 4mL, Cyan: 16mL, and Yellow: 64mL NaCl. (Inset) Effect of halogen present in the common salt on SERS enhancement factor.

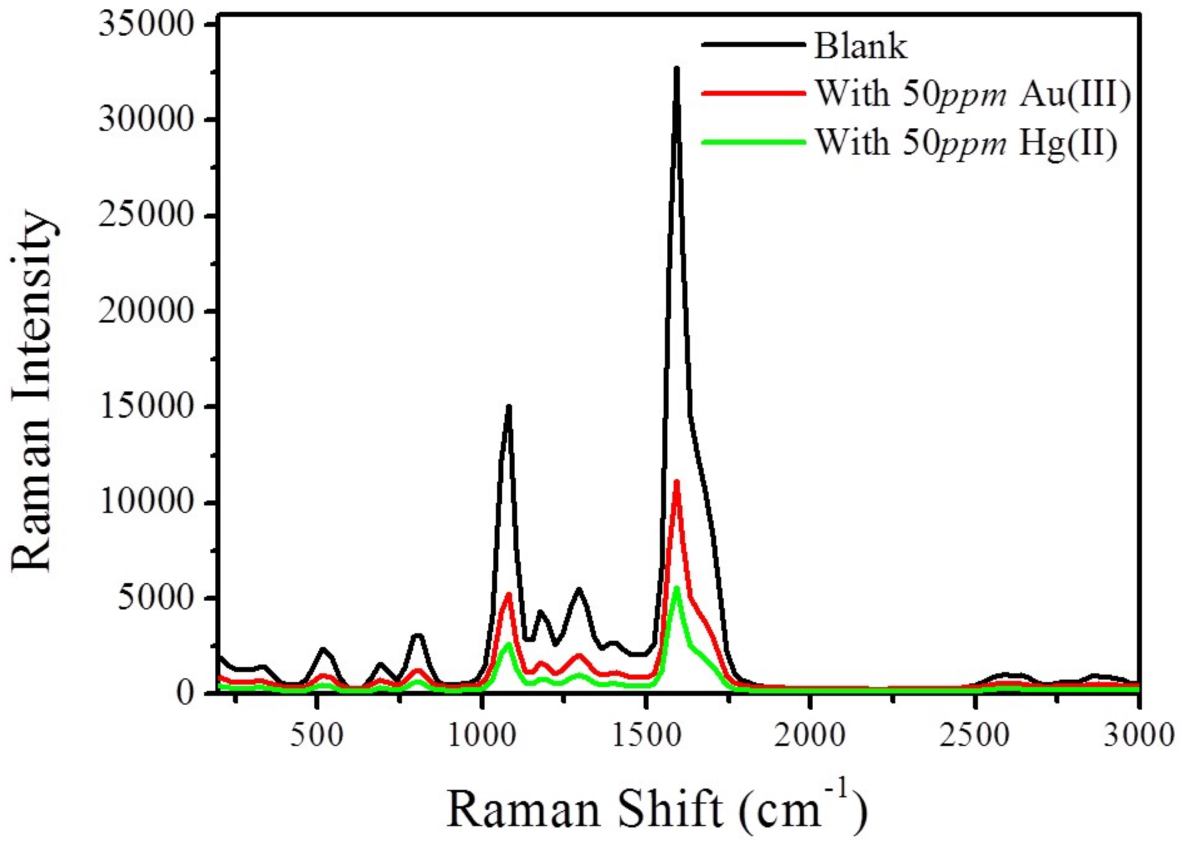


**Figure SI9:** Relative silver nanowire leaching ability by added gold and mercury ions (performed at 50$ppm$ concentration) and the resultant Raman signal (originated from surface adsorbed 4-MBA) quenching. Silver Nanowire Leaching ability of mercury is much more than gold because of the large lattice mismatch between Hg and Ag which is not the case for Au and Ag $(Au = 4.08\text{Å}, Ag = 4.07\text{Å})$.