

*Supplementary Information*

# Designing Efficient Low-Cost Paper-based Sensing Plasmonic Nanoplatforms

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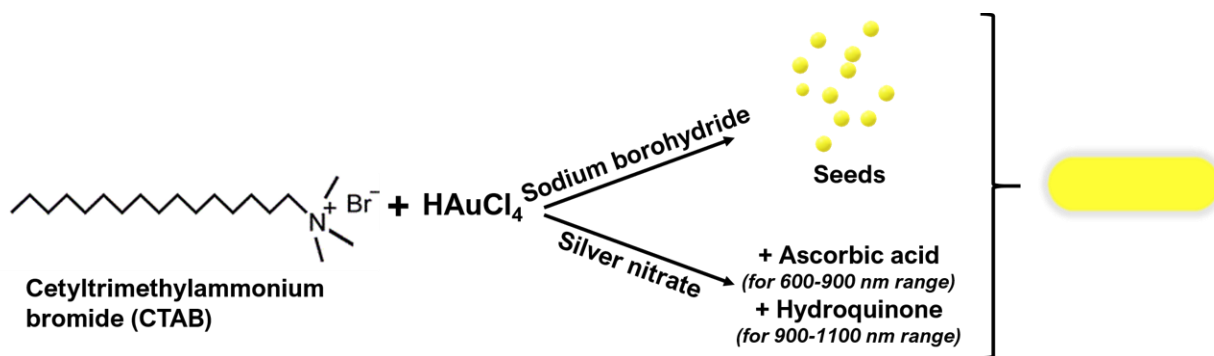
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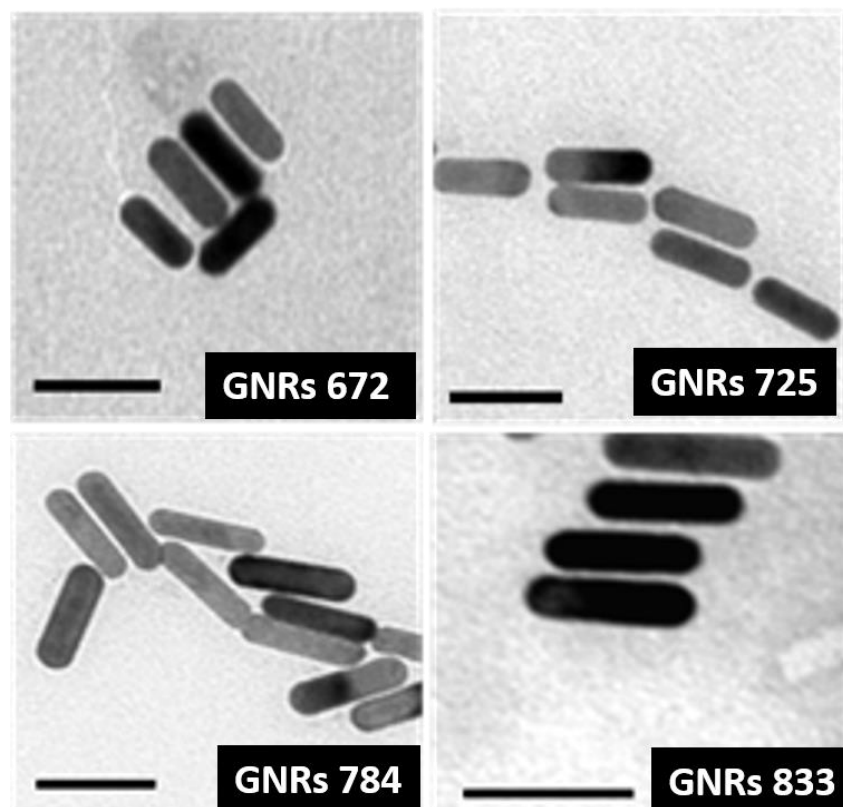
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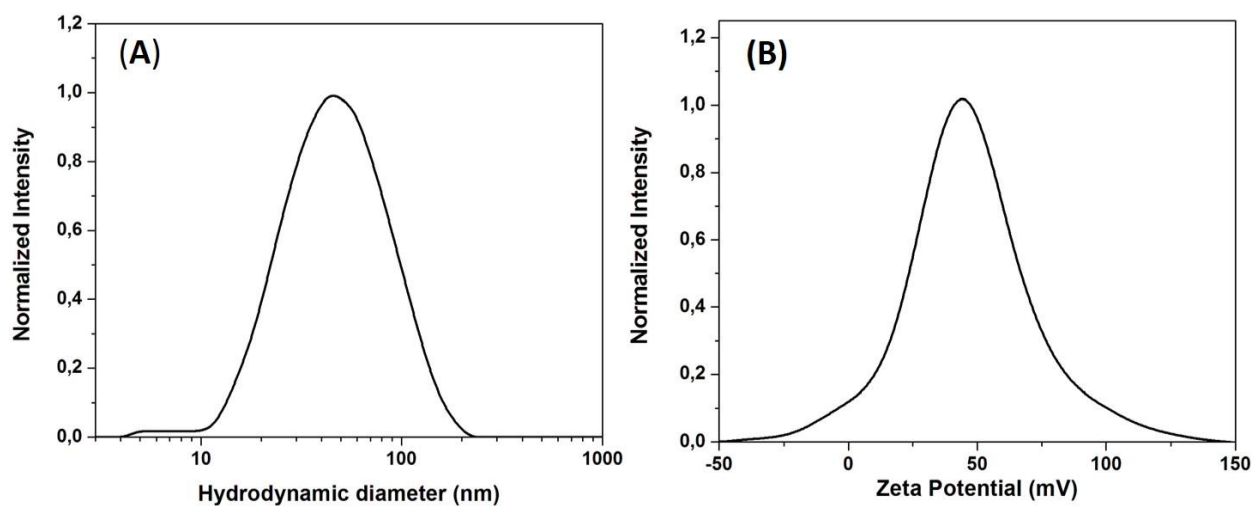
<sup>†</sup> These authors contributed equally to this work



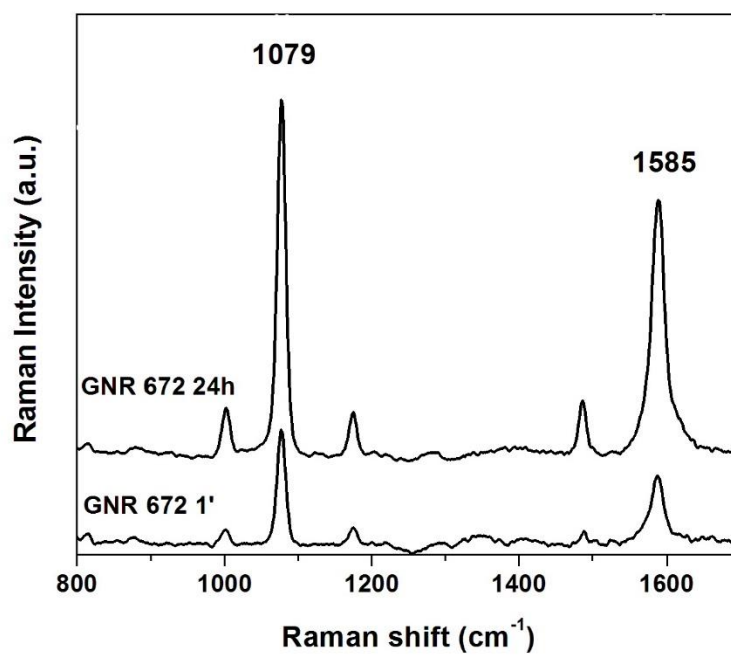
**Figure S1.** Schematic illustration of the seed-mediated method employed for the growth of GNRs.



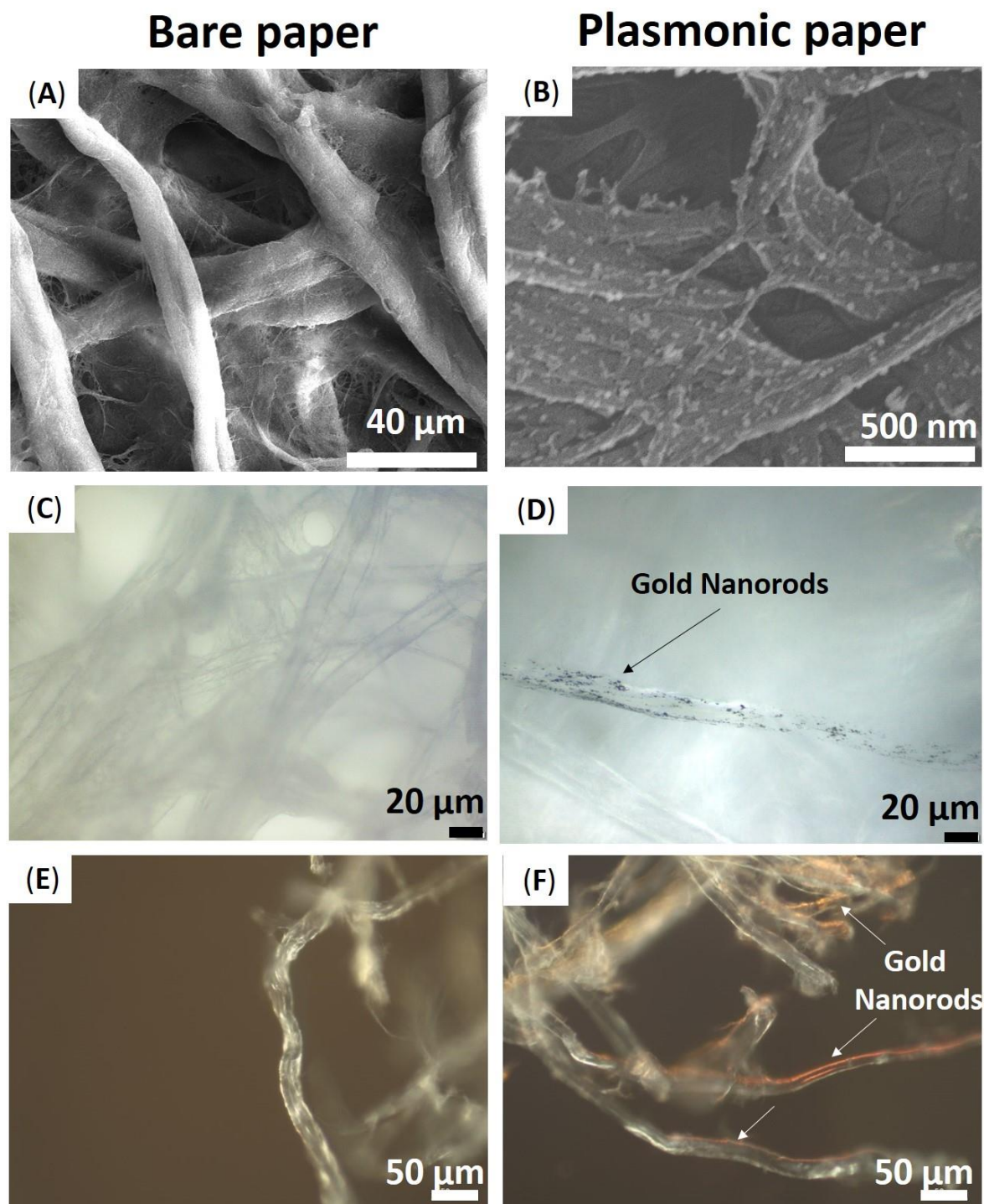
**Figure S2.** Representative TEM images of the selected GNRs with the longitudinal plasmonic band located at 672, 725, 784 and 833 nm, respectively, corresponding to the LSPR spectra presented in Figure 2A.



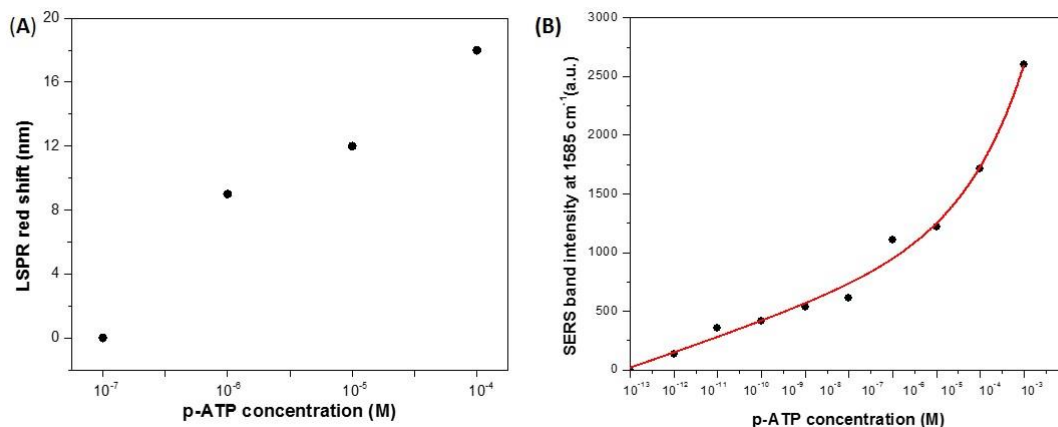
**Figure S3.** (A) DLS and (B) Zeta potential data of the selected GNRs with longitudinal LSPR band at 725 nm.



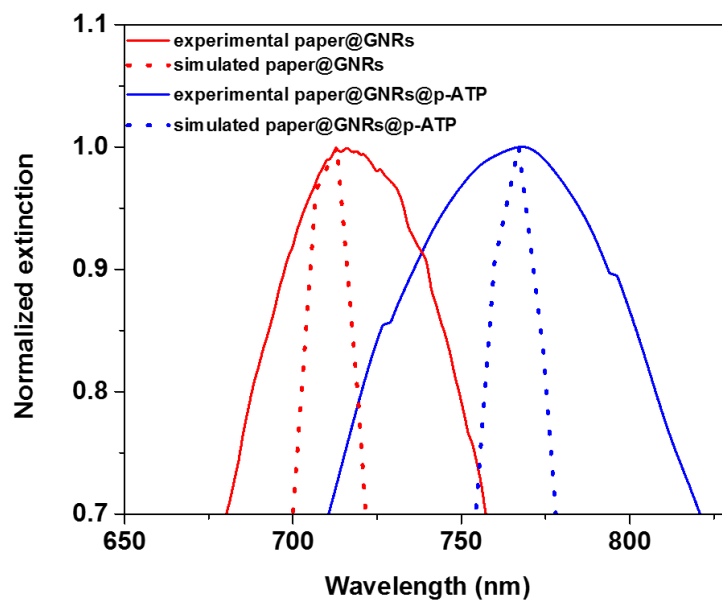
**Figure S4.** Comparison between the SERS spectra of GNRs 672 recorded immediately and after 24 hours of p-ATP grafting.



**Figure S5.** Representative (A, B) SEM, (C, D) optical and (E, F) dark-field images of the bare paper platform and paper@GNRs nanoplateforms, respectively; Arrows indicate the GNRs immobilized on the paper fibers.



**Figure S6.** LoD determined *via* (A) LSPR by measuring the LSPR shift of the p-ATP grafted paper nanoplatfoms with different concentrations of p-ATP analyte and (B) SERS by measuring the SERS intensity of 1585 cm<sup>-1</sup> band as function of p-ATP concentration onto the optimized plasmonic nanoplatfoms.



**Figure S7.** Experimental (solid) and FDTD simulated extinction (dotted) spectra obtained from the considered paper-based plasmonic nanoplatfom before (red spectra) and after p-ATP grafting (blue spectra).