# Supplementary information

## Cu-Ni nanoparticle decorated graphene based photodetector

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Fig. 1S shows absorption curve of visible halogen light as such and after passing through quartz cuvette, DI water and Cu-Ni GrNHC solution in DI water respectively, the intensity was detected by a simple photon control spectrometer and the average change in the intensity was plotted. A rough estimation of absorption was calculated by the percentage difference in their observed intensities because of change in the intensity of 80%, which leads to a change in absorbance of 50%[1]. In our case, we have observed a 61% decrease in intensity when Cu-Ni GrNHC dispersed solution is used instead of DI water. Zhu et al, theoretically reported the enhancement light absorption of graphene using gold nanoparticle[2]. They optimized maximum 30.3% absorption controlled by gold nanostructured.

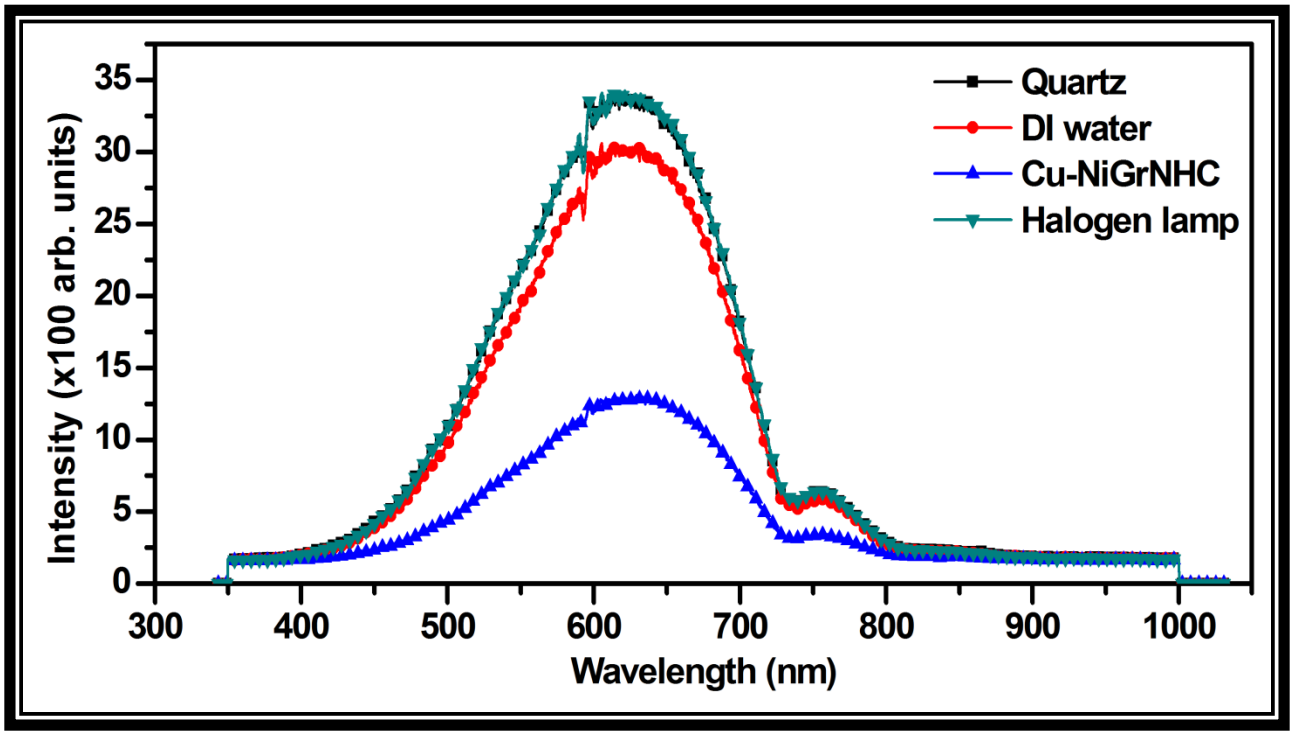


Fig. 1S Absorption of visible light (halogen lamp) without any medium (as such) and after passing through quartz, DI water and Cu-Ni GrNHC solution in DI water detected by the photon control spectrometer

Fig. 2S shows the rietveld analysis of Cu-Ni alloy having different Cu/Ni ratios of 1 and 3. The alloy was cured at 300°C. A dual phase was observed in $Cu_{0.75}Ni_{0.25}$ (Cu/Ni ratio 3) as indicated by the peak splitting. However, at Cu/Ni ratio 1 ($Cu_{0.5}Ni_{0.5}$)only single phase has been observed, which is an evidence in the favor of the maximum solubility of Cu and Ni at this ratio[3].

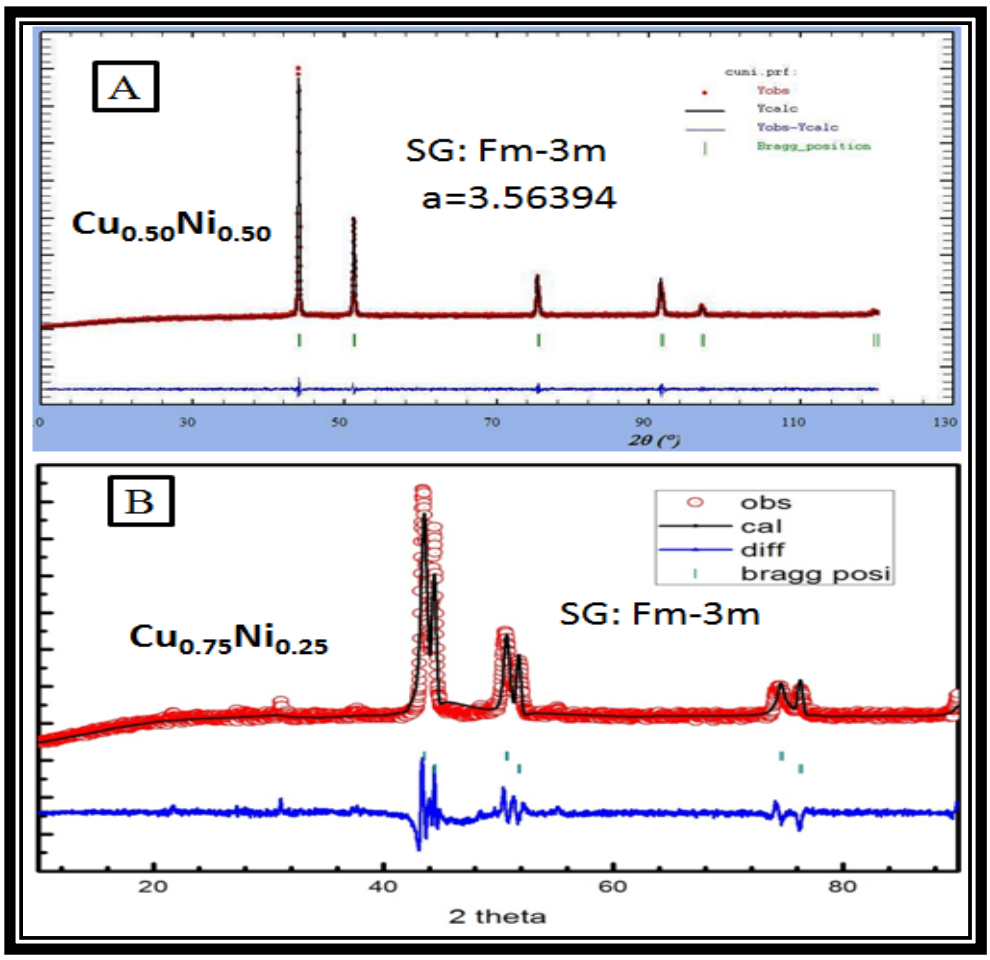


Fig. 2S :Shows rietveldanalysis of X-ray diffraction pattern of $Cu_{1-x}Ni_x$ alloy synthesized by electroless techniques and 300°C HTT (A)x = 0.5 and (B) x = 0.25


1. F. Serra and E. M. Terentjev, *Nonlinear Absorption of Light in Materials with Long-lived Excited States*2010.
2. J. Zhu, Q. H. Liu and T. Lin, *Nanoscale*, 2013, **5**, 7785-7789.
3. I. Ban, J. Stergar, M. Drofenik, G. Ferk and D. Makovec, *Journal of Magnetism and Magnetic Materials*, 2011, **323**, 2254-2258.