

## Electronic Supplementary Information

### Development of a paper-based analytical device for colorimetric detection of uric acid using gold nanoparticles-graphene oxide (AuNPs-GO) conjugates

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#### UV-Visible spectroscopy of graphene oxide at varying times

Graphene oxide (GO) stock solution was prepared by adding 5 mg of GO in 10 mL of HPLC water. This solution was ultrasonicated for 50 min. Next, a diluted solution was prepared by adding 1 mL of the above solution to 9 mL of HPLC water. This diluted solution was ultrasonicated for 20 min. The UV-Vis spectra of the graphene oxide diluted solution were determined at varying times (Fig. S1). The solution was initially kept idle for 20 min. It was then placed in a quartz cuvette of 1 cm path length using a scanning wavelength range of 200-750 nm with a step size of 1 nm. Four different UV-Vis spectra were taken at intervals of 10 min, 20 min and 30 min. It was observed that for all the spectra the prominent peak is at 218 nm owing to the  $\pi \rightarrow \pi^*$  transition of the C=C bond and the shoulder peak is at 297 nm corresponding to the  $n \rightarrow \pi^*$  transition of the C=O bond. The absorption values decreased because of the settling of graphene oxide particles with time. Table S1 gives the absorption values for the corresponding times. After 90 min the absorption value remained approximately constant since all the undispersed GO particles must have settled down by this time.

Table S1 UV-Vis absorption values with respect to time.

Time (min)	Absorption (a.u.)
20	6.6105
50	6.5219
70	5.4110
90	5.3764

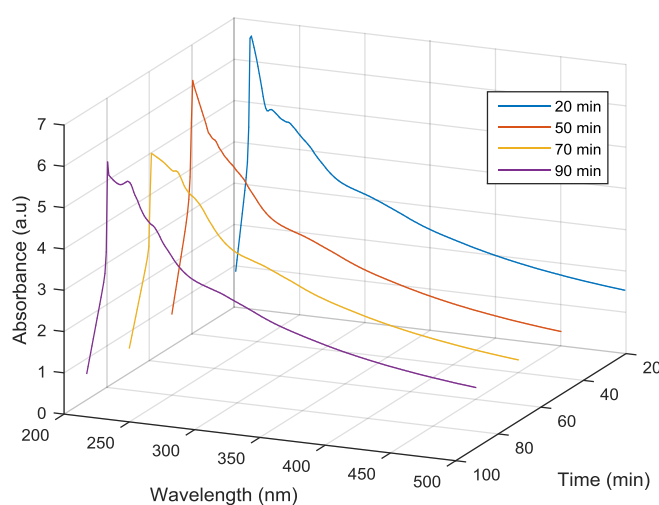


Fig. S1 Time-dependent absorbance change of 0.5 mg/mL graphene oxide.





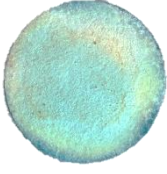


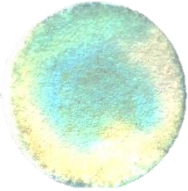




### Color change on paper device at varying time and concentration of uric acid

The effect of varying concentration of uric acid (UA) on paper was analyzed by taking two different concentrations of AuNPs-GO solution.

**Case 1:** The diluted AuNPs-GO solution was prepared by addition of 0.3 mL of stock solution in 3 mL HPLC water. The paper strips were dipped in this solution and dried in the oven. After that, 0.05 mL TMB-H<sub>2</sub>O<sub>2</sub> was pipetted on the AuNPs-GO coated paper strips which resulted in a deep blue color of the paper (Table S2). Varying amounts of uric acid were pipetted on different paper strips. In presence of uric acid, the deep blue colored paper strips faded away after 5 minutes to different extents. It was observed that after 20 minutes the color intensity of the paper strips further decreased.

**Case 2:** The diluted solution of the AuNPs-GO was prepared by adding 0.5 mL of stock solution in 3 mL HPLC water. Further, the same steps as case 1 were followed. Table S2 and Table S3 show the colorimetric change of paper strips at 5 and 20 min for different UA concentrations. The change in color can be easily visualized by the naked eye.

Table S2 0.3 mL AuNPs-GO solution at varying concentrations of uric acid.

Uric Acid Concentration	0.05 mL TMB	0.1 mL Uric Acid	
		@ 5 min	@ 20 min
4 ppm			
15 ppm			
65 ppm			
95 ppm			
















130 ppm			
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Table S3 0.5 ml AuNPs-GO solution at varying concentrations of uric acid.

Uric Acid Concentration	0.05 mL TMB	0.1 mL Uric Acid	
		@ 5 min	@ 20 min
4 ppm			
15 ppm			
65 ppm			
95 ppm			
130 ppm	