Vertical assembly of few-layer graphene decorated with iron oxide nanoparticles on gold surfaces

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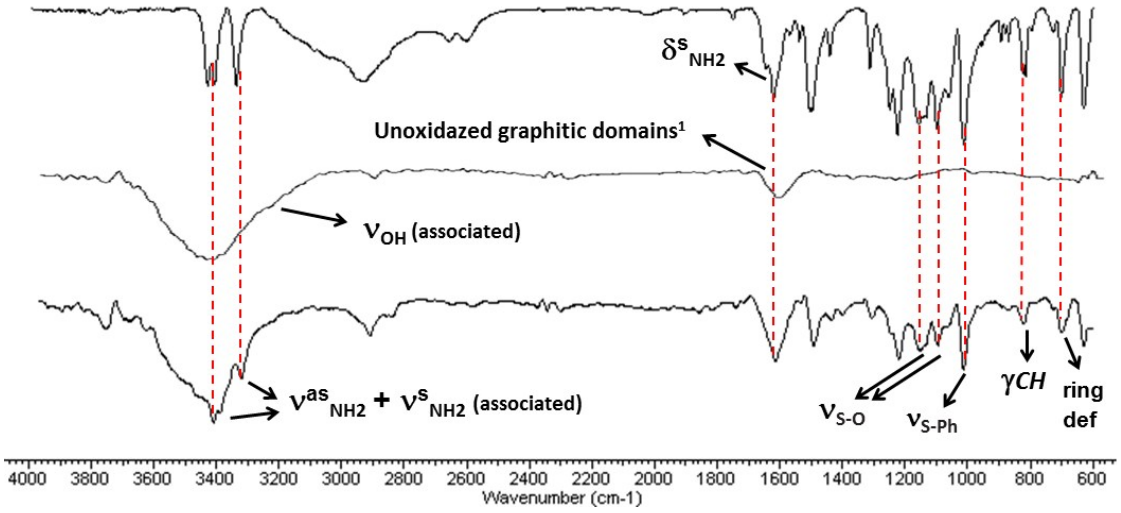
ELECTRONIC SUPPORTING INFORMATION

Table of Content

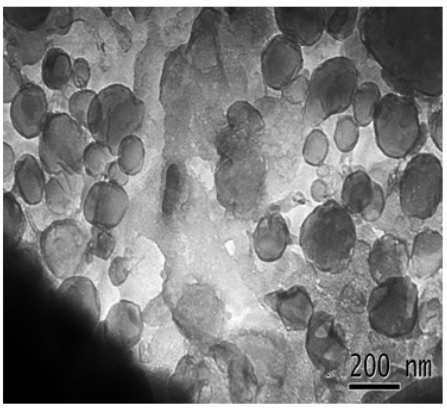
1. **Characterization of Sulf-FLG by TEM and FT-IR**
2. **Characterization of IONPs by TEM, FT-IR, DRX and magnetic susceptibilty**
3. **Vertical assembly of Sulf-FLG@IONP-Dop on gold surface**
4. **SEM micrographs and EDX elemental analysis of Au-*v*- Sulf-FLG@IONP-Dop (measured after 1 month of assembled).**
5. **System employed for measuring the electrochemical properties of Au_*v*_Sulf-FLG@IONP-Dop.**

ESI 1: Characterization of Sulf-FLG by TEM and FT-IR

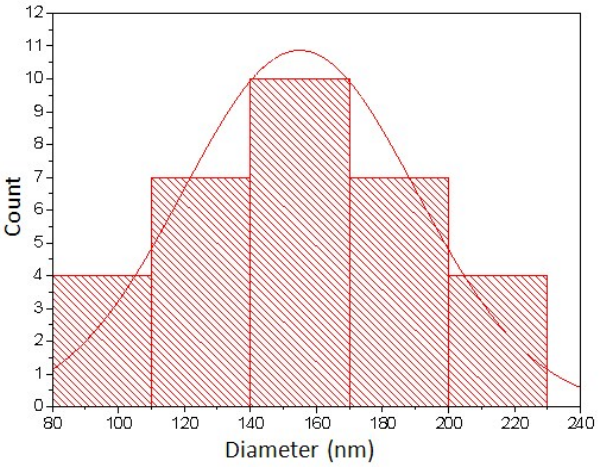
FT-IR spectra



Size distribution of Sulf-FLG



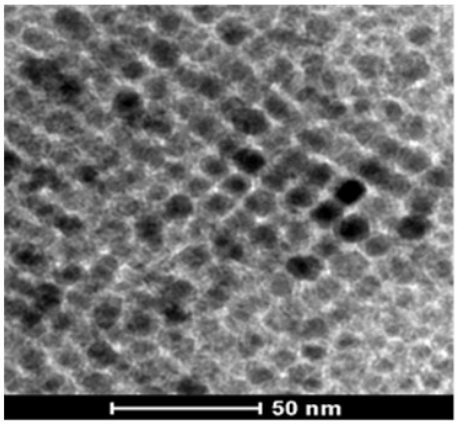
TEM Micrograph of **Sulf-FLG**



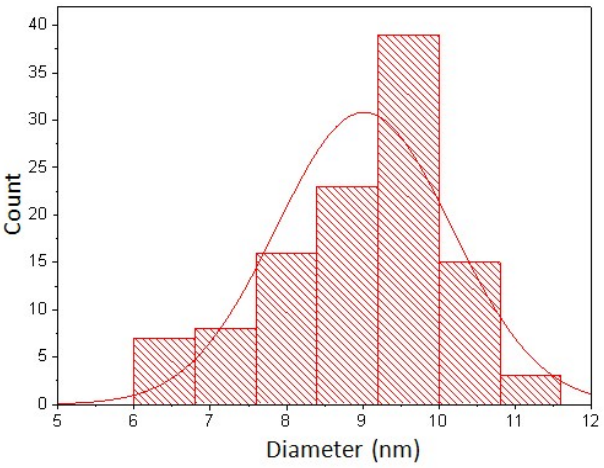
TEM: 151.30 ± 35.23 nm, mean size

ESI 2: Characterization of IONPs by TEM, FT-IR, DRX and magnetic susceptibility

Size distribution of IONPs

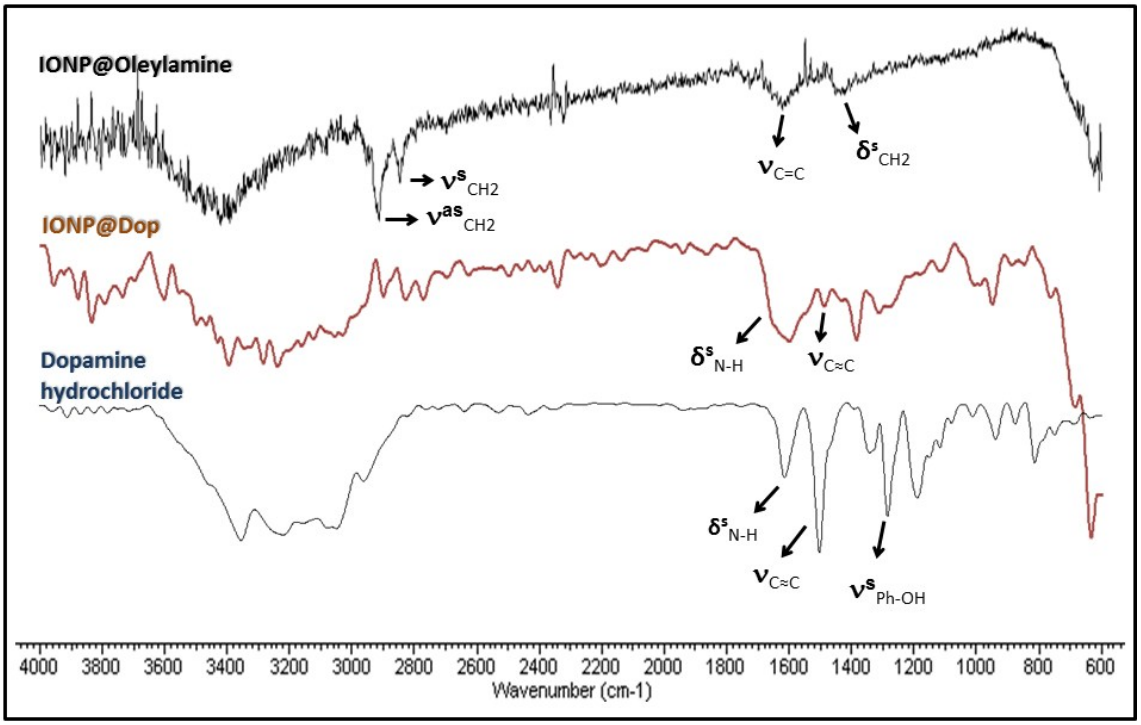


TEM Micrograph of **IONP-dop**

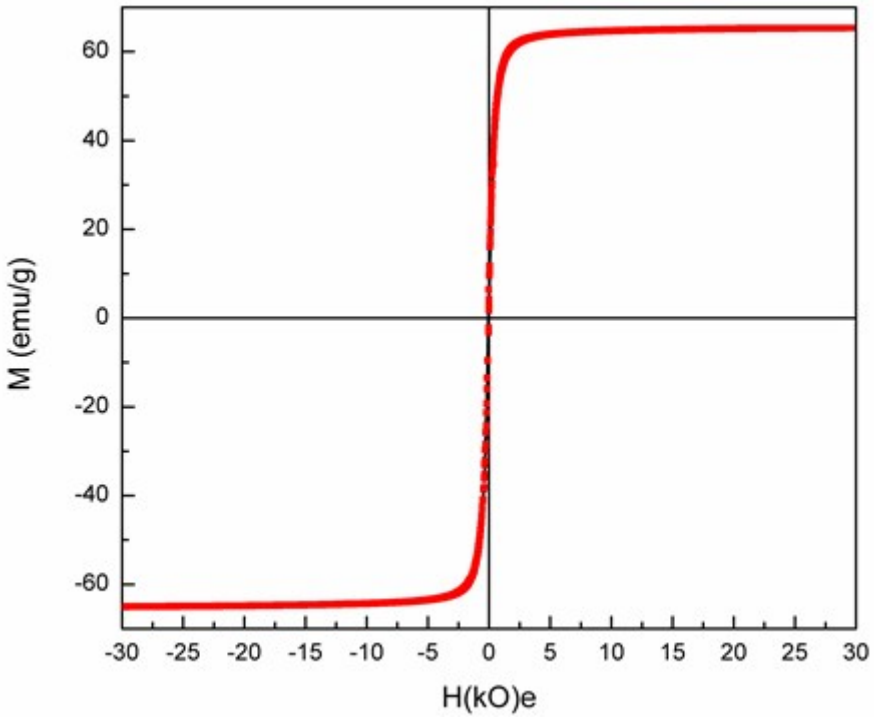


TEM: 9.02 ± 1.15 nm, mean size

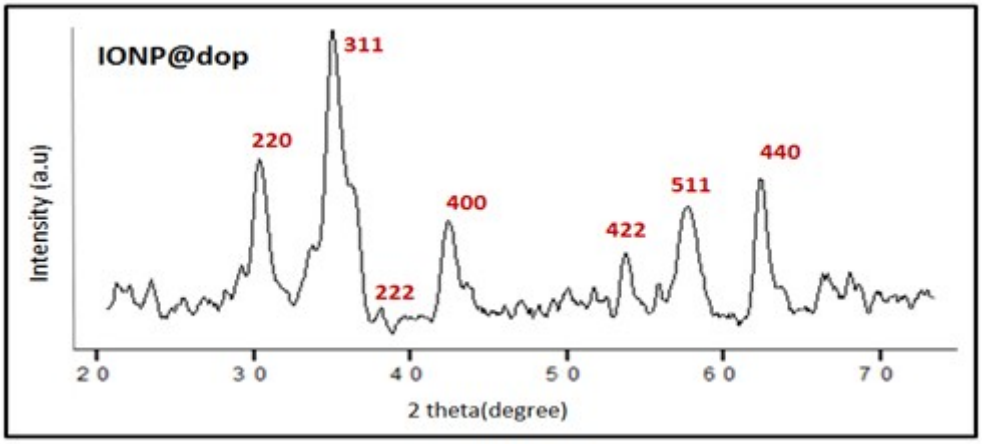
FT-IR spectra of IONP@oleylamine, IONP@Dop and dopamine hydrochloride



Magnetic susceptibility of IONP@Dop



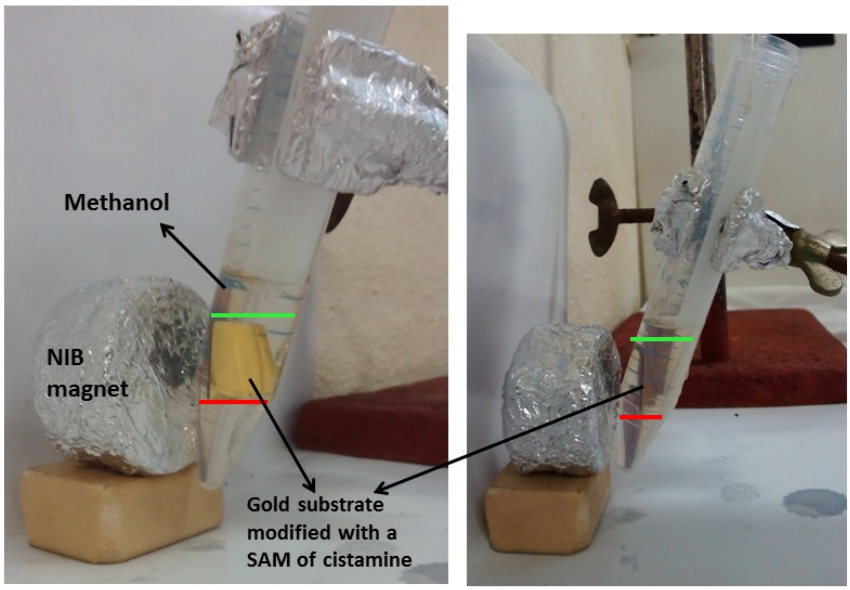
DRX of IONP@Dop



ESI 3: Vertical assembly of Sulf-FLG@IONP-Dop on gold surface

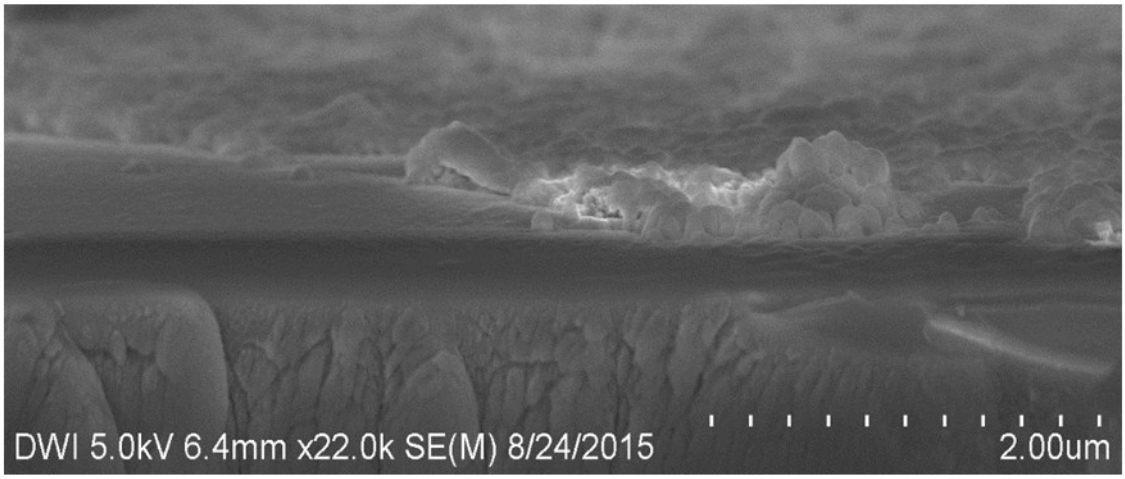
The gold substrates modified with a monolayer of cystamine were introduced in a inclined conical bottom plastic centrifugal tube containing 10 mL of pure methanol. A commercial permanent magnet (NIB Sintered 1.2 T) was located on the bottom of the tube in a disposition parallel to the plane of the gold substrate (See figure below).

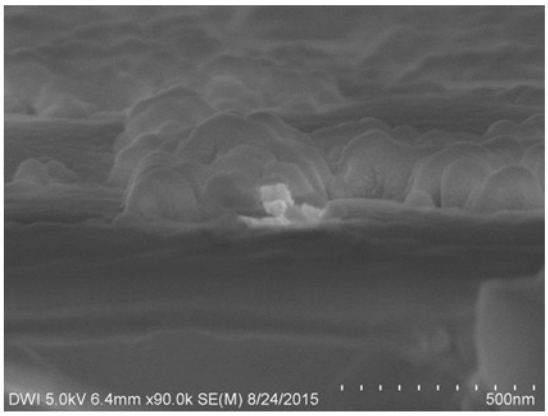
Once set the previously described system, 100 mL of dispersion of Sulf-FLG@IONP-Dop were dropped into the methanol containing tube. Under such conditions the Sulf-FLG@IONP-Dop material was observed to depose on the gold substrate in about an hour. At that time the methanol inside the tube was removed until the top of the square gold substrate touched the air/liquid interface (marked with green line in bellow pictures). In such conditions EDC (1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride)/N-hidroxosuccinimide (50 mg/100 mg) were added to the solution and the recipient was opened to allow the spontaneous evaporation of methanol until the bottom the substrate was observed above the meniscus of the solvent (red lines in the bellow pictures). Under such conditions the magnet was retired and the modified substrate was introduced into an opened recipient containing methanol (15 mL). The system was submitted to gently hand shake for removing all the molecular contaminants. The solvent was removed and the previous procedure was repeated two more times. The substrate was finally dried at room temperature in vacuum.



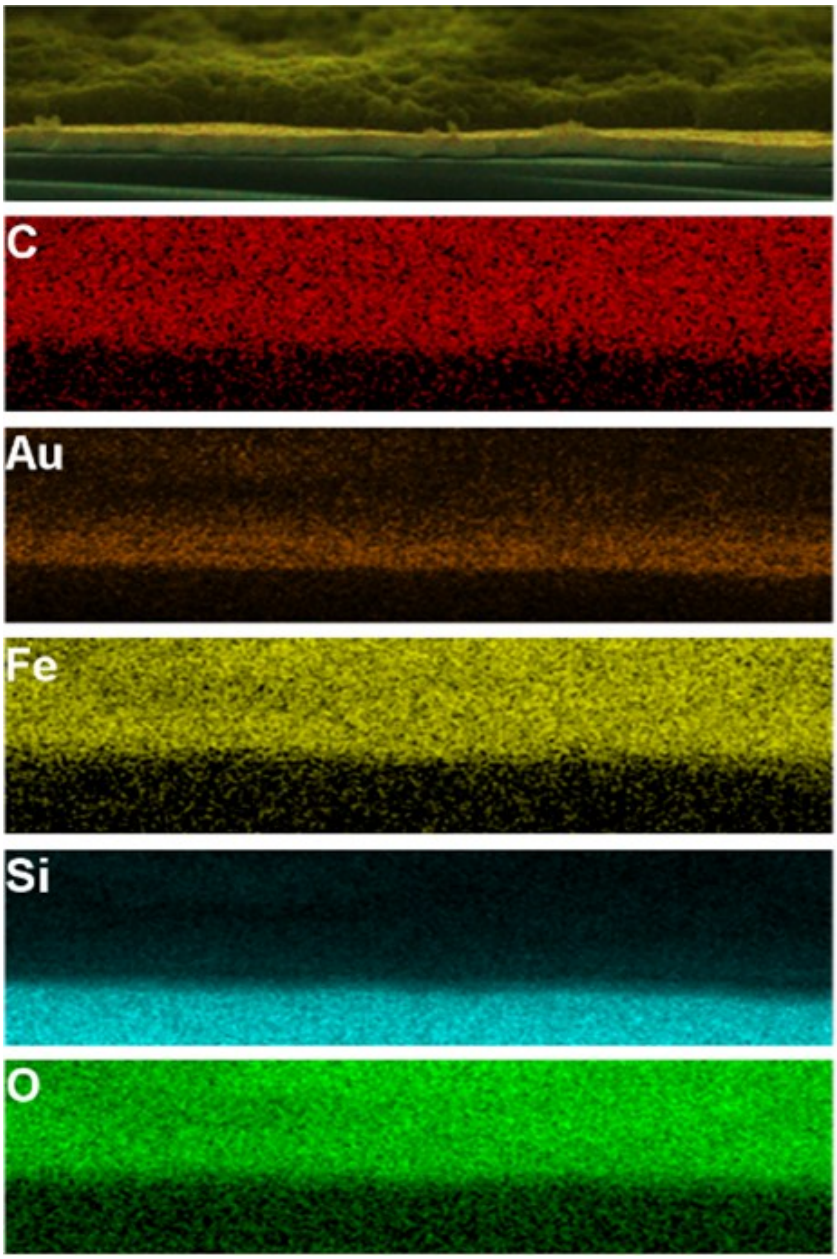
ESI 4: SEM micrographs and EDX elemental analysis of Au-*v*- Sulf-FLG@IONP-Dop (measured after 1 month of assembled)

Au-v- Sulf-FLG@IONP-Dop (measured after 1 month of assembled)

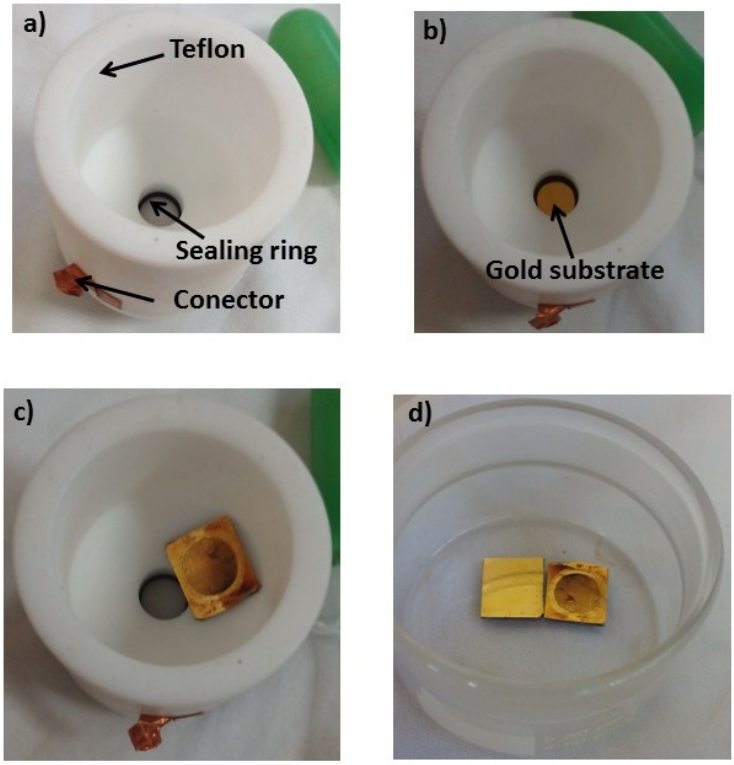




EDX elemental analyses of Au-*v*-SulfFLG@IONP-Dop



ESI 5: System employed for measuring the electrochemical properties of Au_*v*_ Sulf-FLG@IONP-Dop.



a) Picture of the Teflon cell. b) A gold substrate located in the bottom of the cell. c) A gold substrate modified with vertically aligned Sulf-FLG@IONP-Dop used during the electrochemical experiment. d) A clean gold substrate and a gold substrate modified with vertically aligned Sulf-FLG@IONP-Dop after their use in the electrochemical experiments.

References

1. S. Stankovich, R. D. Piner, S. T. Nguyen and Ruoff R. S., *Carb,* **2006**, *44*, 3342–3347.