

**Research article**

# **The hybrid nanobiointerface between nitrogen-doped graphene oxide and lipid membranes: a theoretical and experimental study**

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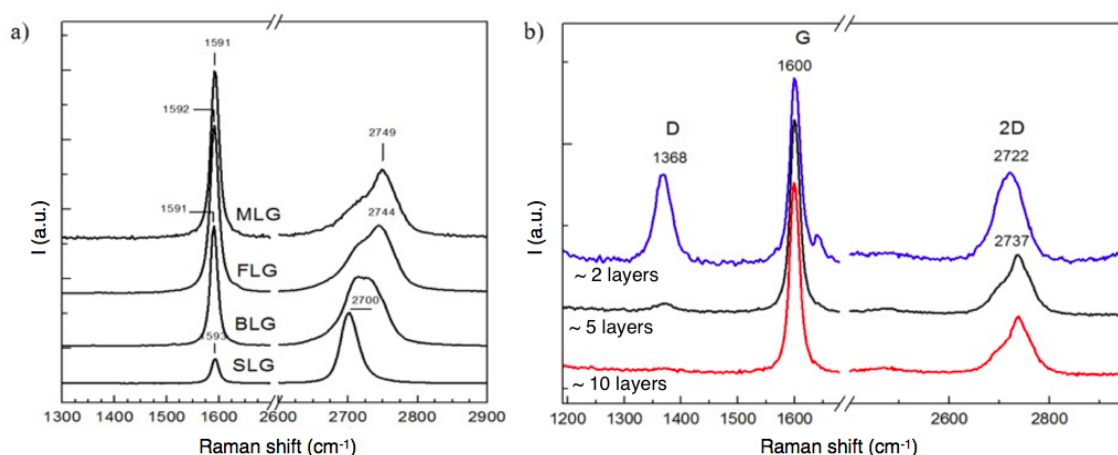
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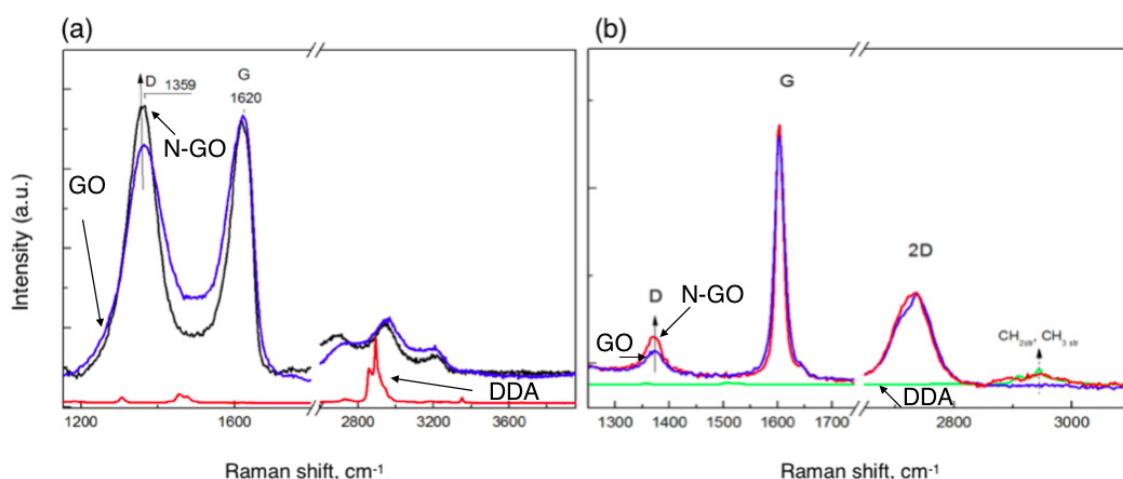
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## **Supporting Information**



**Figure S1.** Raman spectra of graphene samples of different thickness: (a) untreated; (b) 1 h UVO-treated.

The Raman spectra in Figure S1a evidence the signals of  $sp^2$ -bonded carbon layers at about  $1590\text{ cm}^{-1}$  and  $2700\text{ cm}^{-1}$ , assigned respectively to the doubly degenerate zone centre  $E_{2g}$  mode (G band) and to the second order (2D band) of zone-boundary phonons. According to their relative intensities, the shape and the frequency position, such peaks are assigned to double layer graphene (DLG), few-layer graphene (FLG), and multi-layer graphene (MLG). The comparison with the spectra recorded for UVO-treated graphene samples (Figure S1b) indicates that the conversion to GO actually involves only the top surface of the graphene sheets. This finding validates the used approach as an efficient methodology to fabricate a thin overlayer of graphene oxide onto a graphene substrate.



**Figure S2.** Raman spectra of GO (aqueous dispersion) (a) and G/UV-ozone treated (b) after functionalisation with DDA.

The N-GO samples in dispersion (Figure S2a) exhibit a visible enhancement of the D peak. This findings points to the increase of graphitic-defective  $sp^3$  domains likely due to the grafting of the amine molecules at the graphene surface. The hydrocarbon  $CH_2$  and  $CH_3$  stretches in the  $2800\text{--}3200\text{ cm}^{-1}$  region, clearly visible in the DDA spectrum, are instead absent in the N-GO spectrum, probably because they are hidden by the second order graphene signals. For N-GO solid samples (Figure S2b) both the increase of D band and the appearance of  $CH_2$  and  $CH_3$  stretchings are observed. Raman spectra of the N-GO samples functionalised by  $N_2H_4$  or DDA/ $N_2H_4$  did not exhibit detectable Raman signals owing to fluorescence interference.



AIMS Press

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