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Supplementary Information

Electrochemical 4-chlorophenol sensing properties of plasma-treated multilayer graphene modified photolithography patterned platinum electrode

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Figure Captions

Fig. S1 Pictorial representation of the fabrication process for patterning Pt electrodes on a glass substrate by photolithography

Fig. S2 Estimation of Surface area for PMLG sample from AFM image

Fig. S3 Estimation of Surface area for OMLG sample from AFM image

Fig. S4 Stability data measured of OMLG/Pt electrode measured in 0.1 M PBS with 10 μM of 4-CP

Table S1 Detection of 4-CP in tap water samples

Fabrication of Patterned Platinum Electrodes

A schematic diagram of the electrode fabrication is shown in Figure S1. A thin metal film (25 nm titanium (Ti) and 300 nm platinum (Pt)) was deposited by sputtering (Helios, Leybold Optics, USA) onto glass wafers (SCHOTT AG, UK), cleaned with fuming nitric acid (FNA) and dried at 230 °C. The platinum coated glass wafers were then cleaned with FNA, followed by Isopropyl Alcohol (IPA) (Fisher, UK) and dried in nitrogen (N_2). They were dehydrated at 230 °C for 2 hours. Positive photoresist S1813 (Chestech, Warwickshire, UK) was spin-coated on the wafer and baked at 95°C for 1 minute. An acetate mask (Micro Lithography Services Ltd, Essex, UK) was used to define the electrode features. After exposure of the resist, the wafer was developed, rinsed and dried in N_2. Ion beam milling (IBM) (Ion Fab, Oxford Instruments, UK) was used to etch the platinum and the remaining resist removed with N-Methyl-2-pyrrolidone (NMP; Sigma-Aldrich, UK) with ultra-sonication at 60°C for 20 minutes. After IPA cleaning and N_2 drying, the wafer was transferred to RIE80+ (Oxford Instruments, UK) for O_2 descum cycle. The wafer was then cleaned with FNA, followed by SU8-5 (Chestech, Warwickshire, UK) was used to insulate the contact pads.

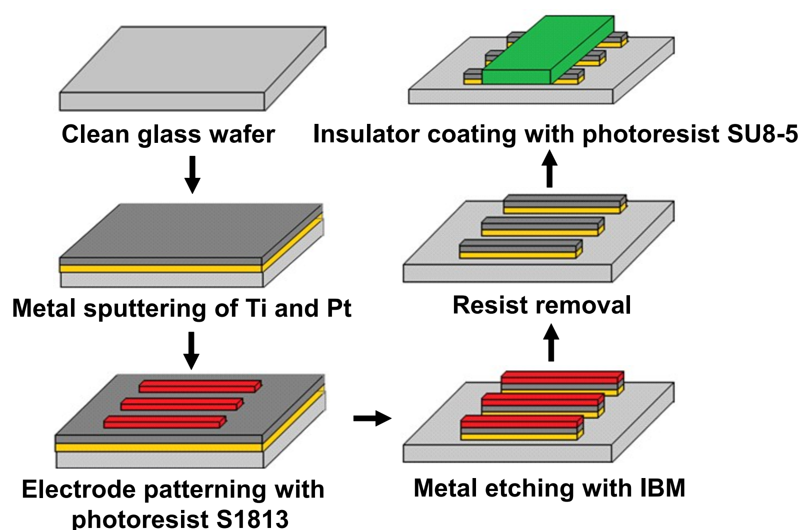
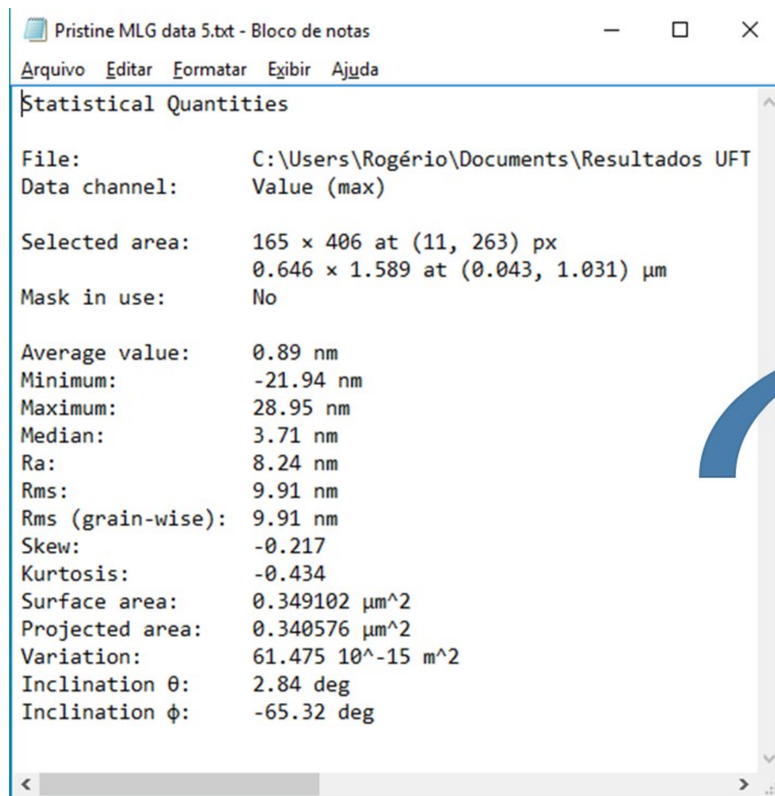


Fig. S1



Pristine MLG data 5.txt - Bloco de notas

Arquivo Editar Formatar Exibir Ajuda

Statistical Quantities

File: C:\Users\Rogério\Documents\Resultados UFT
Data channel: Value (max)

Selected area: 165 × 406 at (11, 263) px
0.646 × 1.589 at (0.043, 1.031) µm
Mask in use: No

Average value: 0.89 nm
Minimum: -21.94 nm
Maximum: 28.95 nm
Median: 3.71 nm
Ra: 8.24 nm
Rms: 9.91 nm
Rms (grain-wise): 9.91 nm
Skew: -0.217
Kurtosis: -0.434
Surface area: 0.349102 µm^2
Projected area: 0.340576 µm^2
Variation: 61.475 10^-15 m^2
Inclination θ: 2.84 deg
Inclination φ: -65.32 deg

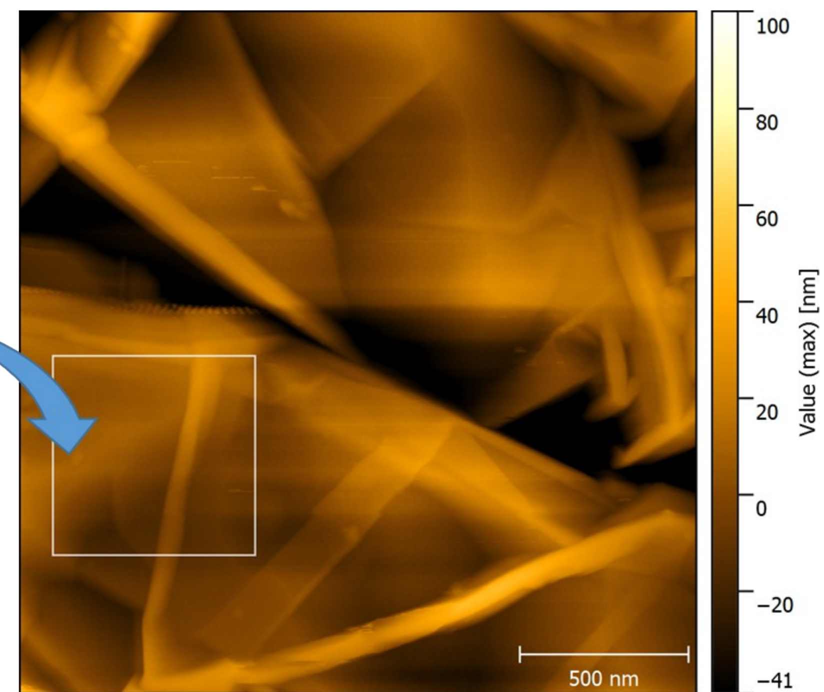
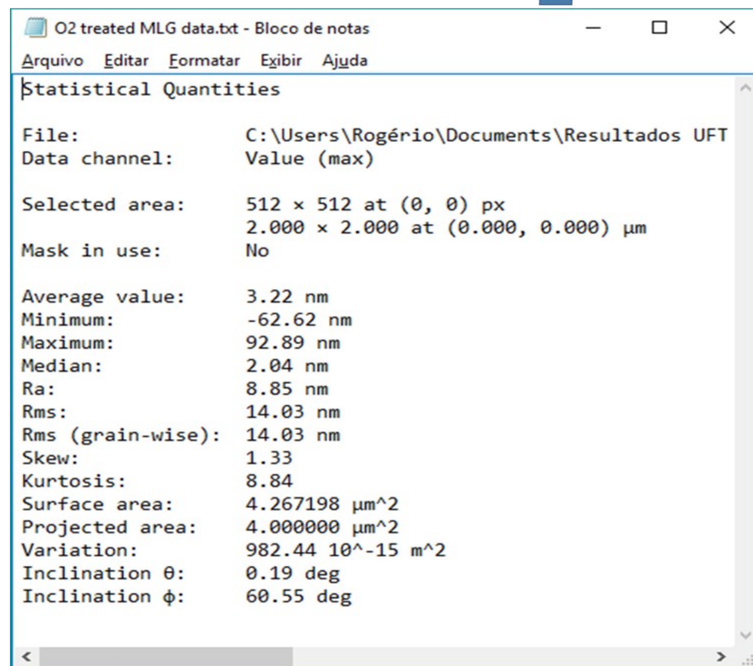


Fig. S2



O2 treated MLG data.txt - Bloco de notas

Arquivo Editar Formatar Exibir Ajuda

Statistical Quantities

File:	C:\Users\Rogério\Documents\Resultados UFT
Data channel:	Value (max)
Selected area:	512 × 512 at (0, 0) px
	2.000 × 2.000 at (0.000, 0.000) µm
Mask in use:	No
Average value:	3.22 nm
Minimum:	-62.62 nm
Maximum:	92.89 nm
Median:	2.04 nm
Ra:	8.85 nm
Rms:	14.03 nm
Rms (grain-wise):	14.03 nm
Skew:	1.33
Kurtosis:	8.84
Surface area:	4.267198 µm^2
Projected area:	4.000000 µm^2
Variation:	982.44 10^-15 m^2
Inclination θ:	0.19 deg
Inclination φ:	60.55 deg

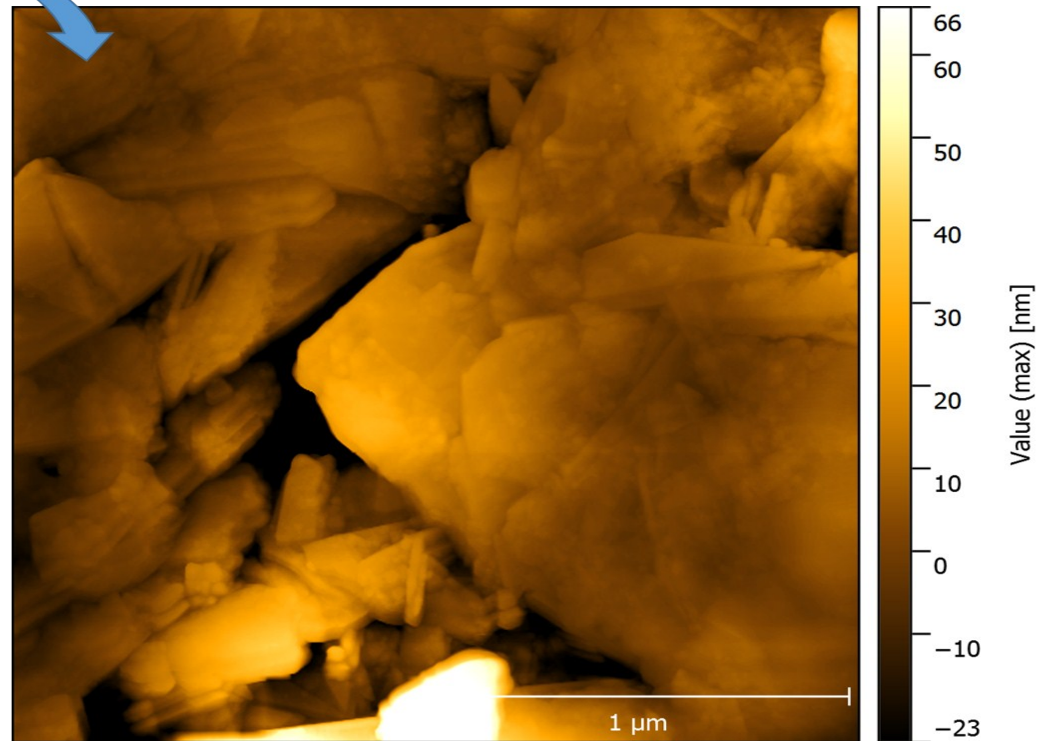


Fig. S3

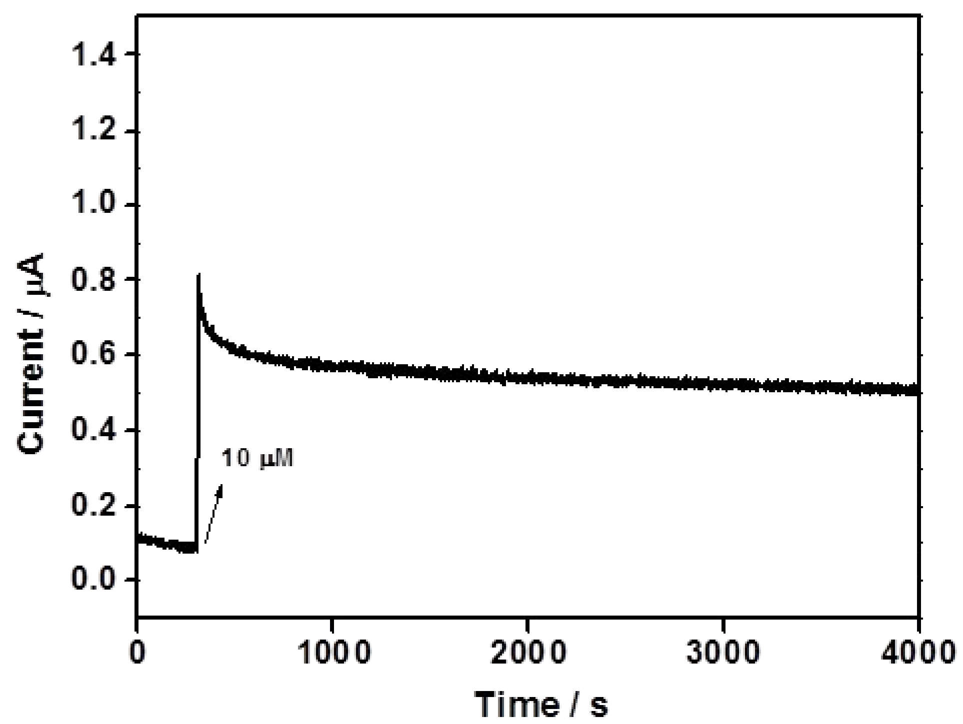


Fig. S4

Table S1

Sample	Added (mM)	Founded (mM)	RSD (%)	Recovery (%)
	4	3.8	2.0	95
Tap water	8	7.3	1.5	91