Surface plasmon resonance for characterization of large-area atomic-layer graphene film: supplementary material

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Published 5 February 2016

This document provides supplementary information to “Surface plasmon resonance for characterization of large-area atomic-layer graphene film,” <http://dx.doi.org/10.1364/optica.3.000151>. © 2016 Optical Society of America

<http://dx.doi.org/10.1364/optica.3.000151.s001>

1. Parameters used for the model of the SPR sensors

The adhesion layer is Chromium in our SPR sensors. The parameters and the complex refractive indices of different materials in the SPR sensors are listed in Table S1. These values were used to calculate the SPR spectra of the graphene coated SPR sensors by fitting the refractive index and the thickness of the transferred graphene layers so that the calculated spectrum best matches with the measured one. Note that some of the values listed in Table S1 may differ from these used in the literature. However, these values have been obtained empirically from the best fits of the measured SPR spectra of the used uncoated sensors, and therefore, their usage is more than justified.

2. Repeatability of our SPR measurements

The repeatability of the SPR measurements was verified by measuring the SPR spectrum from different positions of the fabricated SPR sensors. General trend seen in these measurements was that the variation of the SPR angle was smaller than 0.01° . Therefore, the scattering of the measured properties within the sample was small which is well expected because SPR measurement gathers information from the large area ($\sim \text{mm}^2$), and thus, reveals information from the average properties of the fabricated graphene samples.

To estimate the scattering between different graphene samples, another Au/Al₂O₃ SPR sensor was prepared. Figure S1 shows SPR spectrum measured prior and after the graphene transfer from this sensor. Note that the graphene layer transferred on this sensor originated from a different CVD growth run. As observed, the sensor SPR angle is at 44.64° for uncoated sensor while for the sensor coated with 1L graphene it is at 44.98° . This gives SPR angle

change of $\sim 0.34^\circ$ (corresponding to about $1^\circ/\text{nm}$), which agrees extremely well with the results (Fig. 3a) presented in the main document.

Table S1: Parameters Used for the Model of Our SPR Sensors.

Material	Thickness (nm)	670 nm		785 nm	
		n	k	n	k
Air	∞	1.0003	0.0000	1.0003	0.0000
Al ₂ O ₃	10	2.2510	0.1555	2.4372	0.1670
Au	45	0.2599	4.2529	0.2936	5.2910
Cr	0.5	2.6262	1.0000	1.0000	3.2211
Glass	∞	1.5202	0.0000	1.5162	0.0000

Figure S1: SPR curves measured from another graphene coated Au/Al₂O₃ SPR sensor.