

Graphene Oxide-Copper Plasmonic Interfaces for SPR Biosensing

Yu. V. Stebunov^{1,2}

D. I. Yakubovsky¹, D. Yu. Fedyanin¹,
A. V. Arsenin^{1,2}, V. S. Volkov^{1,3}

¹Moscow Institute of Physics and Technology, Institutskiy 9, Dolgoprudny, Russia

²GrapheneTek LLC, Nobel Street 7, Skolkovo Innovation Center, Russia

³University of Southern Denmark, Campusvej 55, Odense M, Denmark

stebunov@phystech.edu

Graphene oxide (GO) based substrates for biomolecule adsorption significantly improve the performance of surface plasmon resonance (SPR) biosensing, which is currently the most powerful technique for kinetic analysis of biochemical interactions. GO provides higher biosensing sensitivity and also make it easier to produce and use biosensing devices because of its simple handling and storage. However, the widespread use of plasmonic biosensors is limited by gold, which is necessary for plasmon excitation [2]. Unfortunately, gold is quite expensive and not compatible with modern industrial fabrication. Here, we propose SPR sensor chips based on GO-copper plasmonic interfaces (Fig. 1,2). The protection of copper from oxidation is achieved with thin transparent dielectrics deposited onto the metal surface. According to SPR measurements, fitting of the dielectric film thickness allows achieving 75% higher sensitivity of biosensing analysis. The performance of GO-copper sensor chips was also confirmed in a kinetic analysis of protein interactions. The proposed sensor chips can be used with various commercial SPR instruments designed for gold-based interfaces without the need to change their optical configuration (Fig. 2) [3]. The proposed GO-copper plasmonic interfaces will make biosensing analysis more affordable for a wide range of applications beyond laboratory-based research. The work was supported by the RFBR (16-29-03432-ofi-m and 18-07-01339-a).

References

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- [2] Yu. V. Stebunov et al., *ACS Appl. Mat. Interfaces* 7 (2015), 21727-34.
- [3] A. V. Arsenin, Yu. V. Stebunov. US Patent Application No. 20170336401 (Nov 2017).

Figures

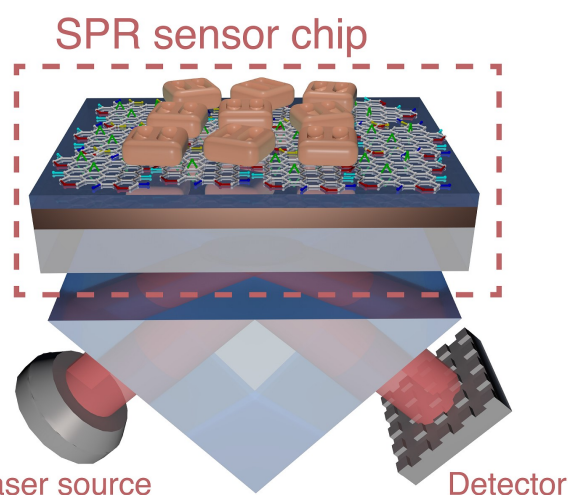


Figure 1: SPR biosensor scheme comprising sensor chip based on graphene oxide-copper plasmonic interface.

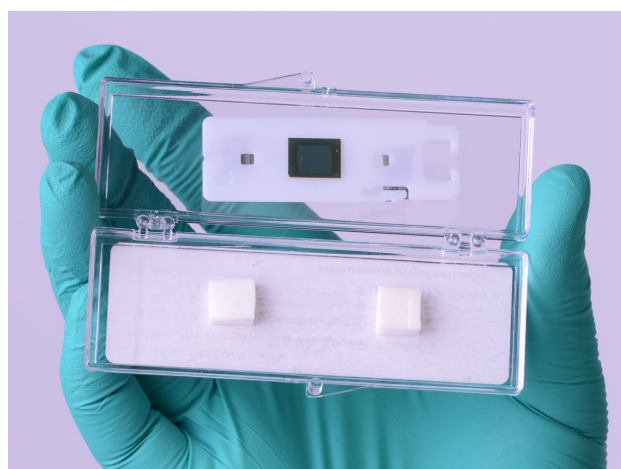


Figure 2: SPR sensor chip GrapheneTek GO-200 on the original mounting plastics from Biacore.