Investigation of correlation between rigidity of graphene-based hybrid materials and responsiveness of sensors device

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Abstract

Graphene is one of the most promising 2D material and it becomes central for many research fields organic electronics, sensing and energy storage.[1] Nevertheless, in some applications graphene oxide (GO), an oxidized form of graphene is more beneficial as the presence of organic moieties enables non-covalent interactions with the target molecules and serves as anchoring point in various reactions allowing formation of functionalized graphene oxide. Since, the presence of oxygen groups decreases of electrical properties such as: conductivity, capacitance, electron transfer in comparison with pristine graphene,[2, 3] to obtain material which combines electrical properties of graphene and ability to form supramolecular interactions the GO is chemically reduced yielding reduced graphene oxide (rGO).

This research aims at developing new generation of piezoelectric pressure sensors based on two-dimensional materials (non-)covalently functionalized with organic molecules and their application in proof-of-concept devices. The study involves the design of a high-efficiency method of graphene oxide (GO) reduction using various reductors, preparation of graphene hybrids material with organic molecules featuring variable rigidity and their processing into thin-films onto flexible surfaces by layer-by-layer method. The schematic illustration for preparation of devices is presented in Figure 1. The combination of different rigidity of molecular pillars and conductivity of rGO will allow to investigate impact on responsiveness of piezoelectric sensors.

References

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Figures

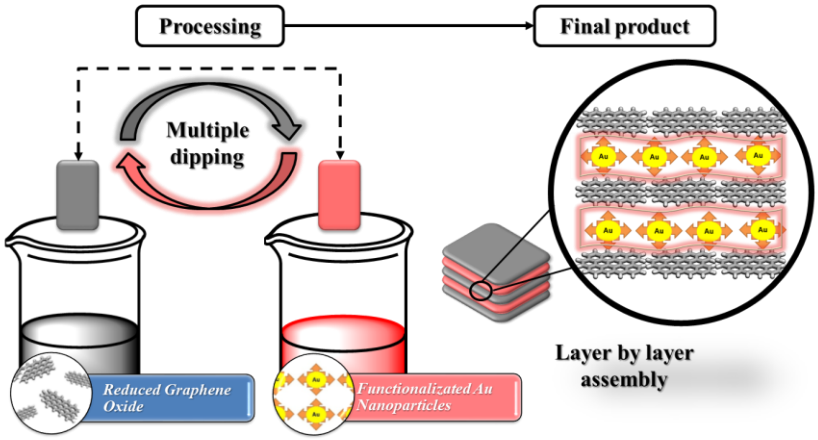

Figure 1: Schematic illustration of layer-by-layer processing.

Acknowledgements

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