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Book of Abstracts

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5th INTERNATIONAL FALL SCHOOL ON ORGANIC ELECTRONICS – 2019 (IFSOE-2019)

Organizers

Division of Chemistry and Material Science of Russian Academy of Sciences

The Ministry of Science and Education of Russia

Enikolopov Institute of Synthetic Polymeric Materials of Russian Academy of Sciences (ISPM RAS)

Lomonosov Moscow State University (MSU)

Printed Electronics Technologies Limited Liability Company (PrintElTech LLC)

Eklogit Limited Liability Company (Eklogit LLC)

Scientific program

1) ***Fundamentals of organic electronics:*** charge transport, modeling, photophysics, etc.

2) ***Design and synthesis of materials for organic electronics:*** organic conductors and semiconductors, dielectrics, substrates, etc.

3) ***Organic field-effect transistors:*** single crystal, polymer and monolayer OFETs, integrated circuits and related devices.

4) ***Organic light-emitting devices:*** OLEDs and OLETs, white light-emitting devices, TADF devices, organic lasers.

5) ***Organic and hybrid solar cells:*** small molecules and polymer photovoltaics, tandem cells, perovskites-based photovoltaics, etc.

6) ***Organic sensors:*** physical (pressure, temperature, photo, etc.) sensors, chemo- and biosensors.

7) ***Characterization techniques:*** various spectroscopy, microscopy, and x-ray scattering techniques, charge mobility measurements, thermal and surface analysis, HOMO and LUMO evaluation, biomedical applications, etc.

8) ***Technologies of organic electronics:*** printing of organic materials and devices, roll-to-roll techniques, ink formulations, encapsulation, etc.

School-conference Chairs

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Changes of Graphene Transistors Electronic Properties by Organic Deposition

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Graphene based technology becomes more and more demand in modern electronics. Depending on scope of use graphene structures should be modified in different ways. Promising way to functionalize graphene is molecular doping.[1] It can be used for photodetectors, transistors and biosensors production.[2]

One method of functionalization in such way uses direct deposition of organic molecules on graphene transistors from solution by ink-jet printing. For ink-jet printing technology, inks must be viscos enough, substrate wettability and has low melting point for stable drop formation and uniform ink deposition on substrate surface. With such limits organic molecules was dispersed in solution with solvent and thickener.[3]

CVD grown graphene was transferred on silicon substrate and transistor structured was formed with Cr/Au contacts. In this work, we used polyaniline (PANI), quatrothiophene (HEX) and perylene dicarboximide (PDI). Ink with this dyes consisted n-methylpyrrolidone (NMP), toluene, chlorobenzene as solvents and isopropanol as thickener. Prepared inks were printed with ink-jet printer Dimatix 3000.

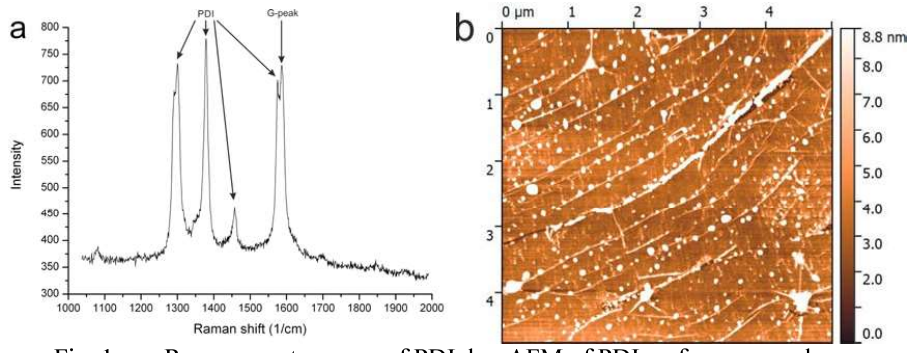

Fig. 1. a – Raman spectroscopy of PDI, b – AFM of PDI surface on graphene

Drops on substrate formed non-uniform structures, but on graphene it is thin layer of molecules was observed. Also it can be seen cluster formation on wrinkles. Transfer current-voltage characteristics (CVC) show changes in electronic structure of graphene and Dirac point is shifted. With such results, we can assume that organic molecules interact with graphene even after simple deposition on its surface.

[1] Wei P. et al. *Nano Lett.* 2013, **13**(5), 1890-1897.
[2] Kuila T. et al. *Progress in Materials Science,* 2012, **57**(7), 1061-1105.
[3] Ng L. W. T. et al. *Springer International Publishing,* 2019.