



Effective approach for graphene electron structure characterization

2,116

0,951

2H

Doping duration

CoCp₂

4H

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CVD synthesis of graphene by **RUSGRAPHENE**

Motivation

Graphene is a material with a zero bandgap and its Fermi level



is located at the contact points of the valence and conduction bands. However, physical adsorption of particles from the environment results in a shift of graphene Fermi level due to surface charge transfer [1-3]. Thus, the analysis of the Fermi level of graphene is important task before application in microand optoelectronics.

Functionalization of graphene by FeCl₃ and CoCp₂

air ambient muffle furnace





Analysis of electronic structure of CVD graphene

ideal graphene real graphene p-doped **L**Fermi



Conclusion

The surface charge transfer results in shift of graphene Fermi level and changing electron structure of initial graphene. The charge concentration results in shift of Fermi level, in changing



of sheet resistance and in changing of Seebek coefficient. We functionalized CVD-graphene by FeCl₃ (electron acceptor) or CoCp₂ (electron donor) and demonstrated changes in sheet resistance and Seebek coefficient.

Thus, the analysis of graphene electronic structure can be done by effective approach using a combination of two methods: measuring sheet resistance and measuring the thermoelectric effect.

CONTACT PERSON

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[1] M. Rybin et al, **Carbon** 96, 196-202 (2016) [2] M. Rybin et al, Applied Physics Letters 112, 033107 (2018) [3] V. Bayev et al, International Journal of Nanoscience 18(03-04), 1940041 (2019) [4] www.rusgraphene.com

