

The resistive switching effect in the composite films of partially fluorinated graphene with a nanocrystals of V_2O_5

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Partially fluorinated graphene (FG) is the most stable compound based on graphene, which makes it a promising material for memristors. Recently, we have developed technology of graphene fluorination in aqueous solution of hydrofluoric acid, allowed to produce fluorinated graphene in amounts sufficient to create the device structures. The current-voltage characteristics for films of this material were found to demonstrate resistive switching [1], which are connected with trace of organic substances used for suspension fabrication [2]. The advantage of resistive memory based on fluorinated graphene films are stability of the material and the ability to create films on solid and flexible substrates at room temperature.

In the present study composite films consisting of partially fluorinated graphene with the addition of nanocrystals (NCs) V_2O_5 (see, Fig.1a, b) are considered. Stable resistive switching effect up to one order of magnitude is observed for these structures, as shown in the current-voltage characteristics, Fig.1.c. To understand the role of V_2O_5 NCs in resistive switching NCs concentrations is being varied in the films of FG.

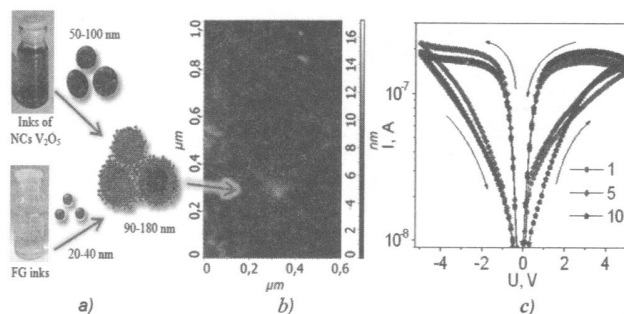


Fig. 1. The composite film of fluorinated graphene with nanocrystals of V_2O_5 : a) photos partially of fluorinated graphene suspension and nanocrystals of V_2O_5 , a schematic representation of nanocrystals capsulated by fluorinated graphene flakes b) the image of the film of fluorinated graphene with nanocrystals of V_2O_5 obtained used an atomic force microscope, and c) the current-voltage characteristic of the film is shown. The effect of resistive switching of up to one order is observed. The number of I-V measurements are given in (c) as a parameter.

References

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Fig.1. A C₁₉₇H₁₀₀ clus

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