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Changes of Electrical Properties of Graphene upon Introduction of Structural Defects and Gas Exposure

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Graphene is considered as a potential candidate for the key material in the ideal 2D nanoelectronics. Recently, it is reported that graphene has an interesting sensitivity to molecular adsorption on it. Such properties are believed to be enhanced by the existence of disorders and ripples inside graphene as well as by the interaction with the substrate underneath. Here, we report the effect of introducing structural disorders to the graphene on its electrical properties such as conductance, transconductance, low frequency noise, which can be successfully described by a simple model of the continuum percolation. In addition, the response of the graphene device to gaseous molecular adsorption was systematically investigated and the results were discussed along with the change in Raman spectra.

Keywords: graphene, defect, disorder, electrical properties