

Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

DNA Nucleotides Detection via capacitance properties of Graphene NAHID KHADEMPAR, Department of Electrical Engineering, Sepidan Branch, Islamic Azad University, MASOUD BERAHMAN, School of Electrical and Computer Eng., Shiraz University, Shiraz, Iran, ARASH YAZDANPANA, Shahid Beheshti University Department of Electrical Engineering Tehran, Iran — In the present paper a new method is suggested to detect the DNA nucleotides on a first-principles calculation of the electronic features of DNA bases which chemisorbed to a graphene sheet placed between two gold electrodes in a contact-channel-contact system. The capacitance properties of graphene in the channel are surveyed using non-equilibrium Green's function coupled with the Density Functional Theory. Thus, the capacitance properties of graphene are theoretically investigated in a biological environment, and, using a novel method, the effect of the chemisorbed DNA nucleotides on electrical charges on the surface of graphene is deciphered. Several parameters in this method are also extracted including Electrostatic energy, Induced density, induced electrostatic potential, Electron difference potential and Electron difference density. The qualitative and quantitative differences among these parameters can be used to identify DNA nucleotides. Some of the advantages of this approach include its ease and high accuracy. What distinguishes the current research is that it is the first experiment to investigate the capacitance properties of graphene changes in the biological environment and the effect of chemisorbed DNA nucleotides on the surface of graphene on the charge.

nahid khadempar
Department of Electrical Engineering, Sepidan Branch, Islamic Azad University

Date submitted: 07 Apr 2016

Electronic form version 1.4