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Two-Dimensional Graphene Optoelectronic Probes for DNA Detection TU HONG, Department of Electrical Engineering and Computer Science, Vanderbilt University, RUI WANG, XUANYANG GE, Department of Physics and Astronomy, Vanderbilt University, YAQIONG XU, Department of Electrical Engineering and Computer Science, Vanderbilt University — With high charge-carrier mobility and large surface-area-to-volume ratio, graphene has become one of the most promising materials for biological and biomedical applications. Here, we demonstrate that graphene field-effect transistors combined with scanning photocurrent microscopy are ideal platforms for detecting DNA molecules. When negatively-charged DNA molecules are attached to graphene surface, significant photocurrent signals can be detected due to the local conductivity change in graphene. Our experimental results show that DNA-induced photocurrent response of graphene can be modulated by adjusting the electrochemical potential through an electrolyte gate. This study indicates that two-dimensional graphene optoelectronic probes can be used to explore the local electrostatic environment change with high electrical sensitivity.

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