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Pivotal role of buffer layer in tuning electronic properties of epitaxial graphene YUFENG GUO, Department of Physics and High Pressure Science and Engineering Center, University of Nevada, Las Vegas, Nevada 89154, USA, WANLIN GUO, Institute of Nanoscience, Nanjing University of Aeronautics and Astronautics, Nanjing, 210016, China, CHANGFENG CHEN, Department of Physics and High Pressure Science and Engineering Center, University of Nevada, Las Vegas, Nevada 89154, USA — We explore the response of epitaxial bilayer graphene on SiC and Ru to electric field and mechanical tuning using first- principles calculations. Our calculations reveal that, in contrast to prevailing view, the buffer layer plays an active role in the distribution of charge transfer within the epitaxial graphene layers and with the substrate. The charge distribution and electronic structure are also sensitive to the type of substrate. These results provide new insights for fundamental understanding and practical application of these fascinating materials.

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