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Coherent Generation of Photo-Thermo-Acoustic Wave from Graphene Sheets[1] YICHAO TIAN, Institute of Physics, CAS, HE TIAN, Tsinghua University, YANLING WU, LEILEI ZHU, Institute of Physics, CAS, LUQI TAO, Tsinghua University, WEI ZHANG, Institute of Physics, CAS, YI SHU, DAN XIE, YI YANG, Tsinghua University, ZHIYI WEI, XINGHUA LU, Institute of Physics, CAS, TIAN-LING REN, Tsinghua University, CHIH-KANG SHIH, Department of Physics, Texas University at Austin, JIMIN ZHAO, Institute of Physics, CAS — Many remarkable properties of graphene are derived from its large energy window for Dirac-like electronic states and have been explored for applications in electronics and photonics. In addition, strong electron-phonon interaction in graphene has led to efficient photo-thermo energy conversions, which has been harnessed for energy applications. By combining the wavelength independent absorption property and the efficient photo-thermo energy conversion, here we report a new type of applications in sound wave generation underlined by a photo-thermo-acoustic energy conversion mechanism. Most significantly, by utilizing ultrafast optical pulses, we demonstrate the ability to control the phase of sound waves generated by the photo-thermal-acoustic process. Our finding paves the way for new types of applications for graphene, such as remote non-contact speakers, optical-switching acoustic devices, etc.

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