Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

The positive piezoconductive effect in graphene KANG XU, Nanjing University, KE WANG, University of Science and Technology of China, WEI ZHAO, ERFU LIU, Nanjing University, WENZHONG BAO, MICHAEL S. FUHRER, University of Maryland, YAFEI REN, ZHENHUA QIAO, University of Science and Technology of China, BAIGENG WANG, DINGYU XING, FENG MIAO, Nanjing University — As the thinnest conductive and elastic material, graphene is expected to play a crucial role in post-Moore era. Besides applications on electronic devices, graphene has shown great potential for nano-electromechanical systems. While interlayer interactions play a key role in modifying the electronic structures of layered materials, no attention has been given to their impact on electromechanical properties. Here we report the positive piezoconductive effect observed in suspended bi- and multi-layer graphene. The effect is highly layer number dependent and shows the most pronounced response for tri-layer graphene. The effect, and its dependence on the layer number, can be understood as resulting from the strain-induced competition between interlayer coupling and intralayer transport, as con?rmed by the numerical calculations based on the non-equilibrium Green's function method. Our results enrich the understanding of graphene and point to layer number as a powerful tool for tuning the electromechanical properties of graphene for future applications.

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Date submitted: 06 Nov 2015 Electronic form version 1.4