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Thermoelectric microscopy for imaging disorder in epitaxial graphene SANGHEE CHO, STEPHEN KANG, WONDONG KIM, HO-KI LYEO, Korea Research Institute of Standards and Science, EUI-SUP LEE, SUNG-JAE WOO, YONG-HYUN KIM, Korea Advanced Institute of Science and Technology, KI-JEONG KONG, Korea Research Institute of Chemical Technology, ILYOU KIM, HYEONG-DO KIM, Pohang University of Science and Technology, TONG ZHANG, JOSEPH STROSCIO, National Institute of Standards and Technology — Thermopower, an electron transport property, is a measure of thermal energy relative to the Fermi-energy E_F and thus reflects the asymmetry in the density of states (DOS) with respect to E_F. We use thermopower as a microscopic probe of electronic properties of epitaxial graphene grown on SiC(0001), for which a scanning probe microscopy method has been developed by modifying a ultra-high-vacuum atomic force microscope. This method has a particular sensitivity to the electronic states near E_F. We thereby could image structural defects and strain fields that cause distortions in the electronic states near E_F. Such a capability allowed us to explore how the structural disorder is correlated and how the correlation evolves by responding to inherent strain in epitaxial graphene. Furthermore, striking images of atomically varying states and the finding of one-dimensional quantum confinement will be presented, demonstrating the ability to probe local DOS at the extreme scale.

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