Abstract Submitted
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Ultrafast electroic-state dynamics of graphite probed by time-resolved photoemission spectroscopy Y. ISHIDA, T. TOGASHI, K. YAMAMOTO[1], RIKEN SPring-8 Center, M. TANAKA, T. TANIUCHI, T. KISS, A. SHIMOYAMADA, K. ISHIZAKA, M. NAKAJIMA, T. SUEMOTO, S. SHIN[2], ISSP U. Tokyo — Time-resolved photoemission spectroscopy (250-kHz repetition of 1.5-eV pump and 5.9 eV probe pulses with durations of ∼170 fs) using a hemispherical electron-energy analyzer (VG Scienta SES2002) is employed to investigate the ultrafast electronic-state dynamics of highly oriented pyrolytic graphite. We directly observe electrons excited to 0.75 eV above the Fermi level within 0.1 ps after the pump, reflecting the conical dispersion of graphite about the Fermi level [1]. The excited state decays over ∼20 ps with at least two time scales. The longer time scale shows little pump-power dependence, indicating that the decay is independent of the excitation population. We also find a peculiar increase of the spectral weight at the Fermi level throughout the transient state, which can be modeled by a dynamical broadening of the electronic states due to hot optical phonons generated by the pump [2]. [1] S.Y. Zhou *et al.*, *Nature Phys.* **2**, 595 (2006). [2] T. Krampfrath *et al.*, *Phys. Rev. Lett.* **95**, 187403 (2005); D. Sun *et al.*, *Phys. Rev. Lett.* **101**, 157402 (2008).

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