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Anisotropic phonon anomaly in Bi2212 manifested by electron-phonon coupling[1] JIANDONG GUO, HUAJUN QIN, JUNREN SHI, YANWEI CAO, KEHUI WU, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China, JIANDI ZHANG, E.W. PLUMMER, Louisiana State University, Baton Rouge, LA 70808, J. WEN, G.D. GU, Brookhaven National Laboratory, Upton, NY 11973 — Electron-phonon coupling (EPC) is one of the important issues in condensed matter physics. Angle-resolved photoemission spectroscopy has been recognized as a powerful tool for the study of EPC by determining the renormalization of electron self energy. For the phonon counterpart, we measure the momentum-dependent phonon spectra of an optimal doped cuprate Bi2212 with high-resolution electron energy loss spectroscopy. The apical oxygen vibration mode at 80 meV exhibits distinct anisotropic anomaly due to EPC. By analyzing the phonon lifetime, the momentum-dependent EPC strength is determined with the knowledge of electron band structure. It is emphasized that the combination of analyses of phonon and electron structures leads to an unambiguous and comprehensive description of EPC.

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