Investigation of the Electrical Field Sensitivity of Sub-µm Y-Ba-Cu-O Detectors

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Abstract —The behavior of sub-µm-sized thin-film $YBa_2Cu_3O_{7-x}$ (YBCO) detectors under illumination with picosecond terahertz (THz) pulses was investigated. Real-time measurements with a temporal resolution of 15 ps full width at half maximum (FWHM) were performed at ANKA, the synchrotron facility of the KIT, and the UVSOR-III facility at the Institute of Molecular Science in Okazaki, Japan. The capability of YBCO detectors to reproduce the shape of a several picoseconds long THz pulse was demonstrated. Single-shot measurements adhering to a reversal of the direction of the electrical field of the THz radiation were carried out. They provided evidence for the electrical field sensitivity of the YBCO detector. Exploiting the electrical field sensitivity of the YBCO detector the effect of microbunching was observed at UVSOR-III.

Keywords (Index Terms) — Yttrium barium copper oxide, electrical field sensitivity, THz detectors, Zero-bias detection, synchrotron radiation