

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

The emission mechanism of THz electromagnetic waves from Bi2212 mesa device CHIHARU WATANABE, HIDETOSHI MINAMI, TAKEO KITAMURA, TAKANARI KASHIWAGI, University of Tsukuba, RICHARD KLEMM, University of Central Florida, KAZUO KADOWAKI, University of Tsukuba — From the detailed study of the severe temperature inhomogeneity of the Bi2212 IJJ mesa structure often forming “hot-spot” at relatively higher bias current region, while the electromagnetic waves are emitted, multi terminal potential measurement of the mesa device has revealed that the equipotential part of the mesa can only give universal ac-Josephson relationship between the potential difference and the frequency measured by the FT-IR spectrometer, and it is violated as the potential is measured in the region where the hot-spot is formed. This means that the deviation of the emission frequency from the ac-Josephson effect comes from a gradient of the electrical potential distribution. This strongly suggests that the electromagnetic waves at THz frequency may be generated in the superconducting part of the mesa, where the static electric potential is uniform, satisfying the ac-Josephson relation universally no matter how much temperature gradient is.

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Date submitted: 02 Nov 2015

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