446.

Title: Geometrical Full-Wavelength Resonance Mode Generating Terahertz Waves from a Single-Crystalline Bi(2)Sr(2)CaCu(2)O(8+delta) Rectangular Mesa

Author: Kashiwagi, T ; Yamaki, K ; Tsujimoto, M ; Deguchi, K ; Orita, N ; Koike, T ; Nakayama, R ; Minami, H ; Yamamoto, T ; Klemm, RA ; Tachiki, M ; Kadowaki, K

Source title: JOURNAL OF THE PHYSICAL SOCIETY OF JAPAN

Volume: 80 Issue: 9

Publication year: SEP 2011

Abstract: The terahertz radiation from a rectangular mesa of single-crystalline Bi(2)Sr(2)CaCu(2)O(8+delta) with dimensions of 80 x 320 x 1.6 mu m(3) fabricated by Ar and focused ion bean milling techniques was studied by Fourier transform infrared (FTIR) spectroscopy and angular distribution measurement of the radiation intensity. The emission measured using the FTIR spectrometer is centered at 0.9219 THz, which corresponds to exactly twice of that previously observed from mesas of the same width. The spectral width was as narrow as 7.5 GHz, which is limited by the instrumental resolution. The radiation obeys the ac Josephson relation and has a tunability of about 7% in frequency. The angular distribution of the emission power was analyzed using the conventional patch antenna theory. Both results strongly suggest that the excitation mode with a standing full-wavelength may be observed across the mesa width as the fundamental mode, instead of the half-wavelength mode commonly observed previously.