Magnetic field effects and dynamical control of terahertz electromagnetic wave emission from high-T_c superconducting $Bi_2Sr_2CaCu_2O_{8+\delta}$ mesa structures

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Terahertz electromagnetic waves are very useful for a number of security and medical applicants. Recently, intense and coherent THz emission from high-T_c superconducting $Bi_2Sr_2CaCu_2O_{8+\delta}$(Bi2212) intrinsic Josephson junctions (IJJ's) has been intensively investigated.[1] In this paper, we report magnetic field effects and dynamic control of THz EM wave emission generated by the rectangular mesa structure of Bi2212.

Magnetic field affects anisotropically the emission intensity at $T = 25$ K. THz emission is strongly suppressed by applying magnetic field (less than 200 Oe) parallel to the c-axis. On the other hand, 20 % enhancement of radiated power is observed when appropriate magnetic field ($H = \Phi_0/2$) was applied parallel to the ab-plane. This anistropy seems to be reflected from its anisotropic vortex formation inside Bi2212. We also demonstrates the intensity of THz emission can be controlled dynamically by applying a weak magnetic field, suggesting that we are able to modulate the continuous power of THz emission by applying weak pulses of magnetic field.

[1]L. Ozyuzer *et al.*, Science **318** (2007) 1291, M. Tsujimoto *et al.*, Phys. Rev. Lett. **105**, (2010) 037005.