

166. Title: High-power terahertz electromagnetic wave emission from high-T-c superconducting Bi₂Sr₂CaCu₂O_{8+δ} mesa structures

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Abstract: In this paper, we report intense electromagnetic wave emissions generated by the rectangular mesa structure of intrinsic Josephson junctions with high-T-c superconducting Bi₂Sr₂CaCu₂O_{8+δ}. The radiated power is an order of magnitude stronger than that of the previously observed power of a few μ W. Two emission regions, reversible (R-type) and irreversible (IR-type), with comparable intensities can be observed at different I-V curve locations in the same mesa. We find peculiar temperature dependences of the emission power in both the R- and IR-type radiations, suggesting that a non-equilibrium thermodynamic state may be realized through the dc input current. The R-type emission is quite stable, whereas the IR-type emission is rather unstable. Although the emitted frequency for both cases obeys the cavity resonance conditions, this sharp contrast in emission stability is indicative of two different states in a multi-stacked intrinsic Josephson junction system.