

## Coupling to External Structures: Boundary Conditions for the Bi2212-based Superconducting THz Emitter

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Monochromatic and continuous terahertz (THz) emission with a power of  $\mu\text{W}$  level can be generated by coherent enhancement of the ac-Josephson current in the intrinsic Josephson junction system of  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$  (Bi2212) fabricated into mesa structure.<sup>1</sup> For single and simple mesa devices, the emission frequency fulfills the general resonance conditions determined by the geometrical shape and dimensions of the biased mesa. When the mesa device has some external structures outside the mesa, the resonance is still observed, indicating energy transfer to the external structure through the superconducting substrate. This suggests the necessity of careful treatment of the boundary conditions at mesa edges in order to understand the emission mechanism further, and also gives us a hint to enhance the emission power.

<sup>1</sup>L. Ozyuzer *et al.*, Science **318**, 1291 (2007).