Abstracts

Quasi-Optical Millimeter-Wave Band-Pass Filters Using High-T/sub c/ Superconductors

D. Zhang, M. Matloubian, T.W. Kim, H.R. Fetterman, K. Chou, S. Prakash, C.V. Deshpandey, R.F. Bunshah and K. Daly. "Quasi-Optical Millimeter-Wave Band-Pass Filters Using High-T/sub c/ Superconductors." 1991 Transactions on Microwave Theory and Techniques 39.9 (Sep. 1991 [T-MTT] (Special Issue on Microwave Applications of Superconductivity)): 1493-1497.

Quasi-optical millimeter-wave band-pass filters using YBa/sub 2/Cu/sub 3/O/sub 7/, high- T/sub c/ superconducting films were fabricated on MgO and LaAlO/sub 3/ substrates. Transmitted power through the filter was investigated in the 75 GHz to 110 GHz frequency range at temperatures ranging from 15 to 300 K. At 15 K the measured center frequency and the bandwidth of the superconducting filter were 92 GHz and 0.85 GHz respectively. Measurements of YBa/sub 2/Cu/sub 3/O/sub 7/ filters were compared with similar filters fabricated using gold. At 15 K and 92 GHz, an improvement of 75% in the quality factor of the superconducting filter was obtained compared with a similar gold filter. At lower frequencies, it is expected that such superconducting filters will offer more than an order of magnitude improvement in Q factor over gold filters because of the frequency-squared dependence of the surface resistance versus the gold filter, which has a frequency to the one half dependent surface resistivity. This is the first experimental observation that high-T/sub c/ superconductors can be used as quasi-optical, high-performance, frequency selective surfaces.

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