Miniatutized high-temperature superconducting YBCO filters using interdigital capacitors and meander lines

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ABSTRACT

In this work we design miniaturized high-temperature superconducting microwave filters using interdigital capacitors and meandering lines. We also calculate the surface resistances and the quality factors at different temperatures basing on the flux-pinning theory. By using cross coupling structure, a narrow band filter can be designed and applied on IEEE 802.16e mobile worldwide interoperability for microwave access (WiMAX : 2?{6 GHz). The simulation results show that the center frequency is at 2.47 GHz with a bandwidth of 20 MHz. This filter has a pair of attenuation poles at the passband edge within a size of 6×6 mm2. For fabrication, high-temperature superconducting YBa2Cu3O7-y (YBCO) films were deposited on double-sided 0.5-mm-thick LaAlO3 (LAO) substrates by utilizing a radio-frequency sputtering system. Moreover, this filter is patterned by photolithography process. Finally, this circuit is put into a copper housing. The measurement is performed under temperature 77 K by a closed-cycle temperature cryostat system. In addition, YBCO thin films with oxygen annealing, show that the (006/005) ratio is 1.67, and the critical temperature can be raised to 91K. Key words：high-temperature superconducting、interdigital capacitors、meander lines、YBCO。

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