

## Current Status of HTS Microwave Applications in Japan

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The current status of research and development of HTS microwave applications in Japan is presented. In this paper, we focus on the following items;

- (1) The surface resistance measurement of  $\text{YBa}_2\text{Cu}_3\text{O}_y$  (YBCO),  $\text{DyBa}_2\text{Cu}_3\text{O}_y$  (DBCO) and  $\text{MgB}_2$  thin films under a high dc magnetic field.
- (2) Proposal of HTS pickup coils of NMR.
- (3) Research and Development of HTS filters
  - 3.1 Design and evaluation of compact bandpass filters
  - 3.2 Design of transmit bandpass filters
  - 3.3 Application of HTS bandpass filters to Digital-TV base station

We have studied the dc magnetic field dependence of the surface resistance ( $R_s$ ) of DBCO thin films by changing the strength of an applied magnetic field (0~5 tesla) In the low-temperature region, (below 20 K), the  $R_s$  (H) increased in proportion to the applied magnetic field ( $H_a$ ) up to 5 tesla; however, the  $R_s$  (H) increased in proportion to the square root of  $H_a$  in the high-temperature region (higher than 50 K) and at large  $H_a$  ( $H_a > 3$  tesla). To apply an HTS thin film as the pickup coil material for NMR, we estimated the surface resistance at high dc magnetic field, and found that a DBCO thin film used in a NMR pickup coil would represent a major advance.

We have designed a small lumped-element bandpass filter and a new spiral resonator filter by the electromagnetic simulator, and also designed a large power transmitting bandpass filter using YBCO plate and sliced-microstrip line. We found that YBCO plate filter and sliced-microstrip line filter would present a measure advance to transmit filter.

Toshiba Co. demonstrated a HTS bandpas filter system for a digital TV base station. The system can carry out practical use.

Keywords : surface resistance, HTS bandpass filter, base station, HTS NMR coil