VORTEX VIII

*Eighth International Conference in School Format on*

Vortex Matter in Nanostructured Superconductors

(VORTEX VIII)

A satellite of EUCAS 2013

12-26 September 2013, Rhodes, Greece

KU LEUVEN

# Eighth International Conference on Vortex Matter in Nanostructured Superconductors

## Rhodes (Greece)
## 21-26 September, 2013

# ABSTRACT BOOK

Nanoscale Superconductivity,
Fluxonics and Photonics:
Addressing Grand Challenges

KU Leuven Methusalem Group

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# Frequency dependence of the microwave surface resistance of $MgB_2$ by coaxial cavity resonator

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The two-gap nature of $MgB_2$ affects several properties of this material, among which the em response [1]. This is mainly due to the temperature dependence of the condensed-fluid density. One of the properties determining the microwave (mw)response is the surface impedance, whose real part ($R_s$) plays an important role in superconductor-based mw devices. The frequency dependence of $R_s$ of $MgB_2$ has not been comprehensively investigated; there are only few papers concerning results obtained mainly in films [2]. In HTSC, the frequency dependence of $R_s$ has been investigated by coaxial cavity resonator, with the superconducting sample as inner conductor [3]. The lack of detailed investigations in bulk $MgB_2$ is probably due to the difficulties to produce bulk $MgB_2$ of large dimensions. We have manufactured a coaxial cavity with outer conductor made by a hollow cupper cylinder and inner conductor made by an $MgB_2$ cylindrical rod. The $MgB_2$ rod has been prepared by the reactive liquid Mg infiltration technique[4], which allows one to obtain high-density bulk $MgB_2$ objects of large dimensions. The external cupper tube is 105.4 mm long and has an inner diameter of 10.2 mm; the inner $MgB_2$ rod is 94.3 mm long and has a diameter of 3.8 mm. By measuring the quality factor of the different resonance curves of the cavity, we have determined the frequency dependence of $R_s$ at fixed temperatures (T = 4.2 - 77 K). Our results show that, in the range f=1–8 GHz, the $R_s(f)$ curves follow a f n law, where n decreas on increasing T, starting from n=2 at T=4.2 K down to n=0.7 at T $\approx$Tc. We will report and discuss the obtained results and the properties of the investigated $MgB_2$ material.

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