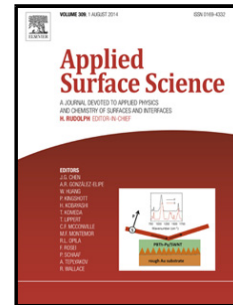


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# Superconducting properties of Magnesium Diboride Thin Film Measured By Using Coplanar Waveguide Resonator

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## Abstract

In this paper we demonstrate the superconducting properties of MgB<sub>2</sub> coplanar waveguide resonator patterned from 300 nm thin film fabricated by vapor deposition. We measured the temperature dependence of the quality factor and the resonant frequency of the resonator. Surprisingly, we also observed hysteretic periodic response of resonance frequency to external magnetic field, which is characteristic of bistable systems with double-well potential, such as superconducting RF SQUID or phase-slip flux qubits. This property seems to be peculiar for granular and disordered superconductors where a superconducting loop of large effective diameter with weak links can be formed.

*Keywords:* MgB<sub>2</sub>, thin film, coplanar waveguide resonator, electromagnetic properties, quality factor, RF SQUID, phase-slip

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## 1. INTRODUCTION

The superconducting coplanar waveguide resonator (CPW) is a device with distributed elements created on a superconducting thin film. Thanks to their low parasitic capacitances and inductances, they have been recently used with great success in experiments with circuit quantum electrodynamics or kinetic inductance detectors. One of the crucial parameters, which allows them to be used for this purpose, is their high internal quality factor. The quality factor is temperature dependent and achieves its maximum

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