

# Novel Magnetic Sensor Using Y-Ba-Cu-O Ceramic Superconductor —Super Magneto-Resistor—

Shoei Kataoka, Shuhei Tsuchimoto, Hideo Nojima,  
Ryusuke Kita, Masaya Nagata and Hidetaka Shintaku

Central Research Laboratories, SHARP Corporation,  
2613-1, Ichinomoto-cho, Tenri, Nara 632, Japan

(Received April 1, 1988; Accepted April 25, 1988)

**Key words:** magnetic sensor, magnetoresistive effect, superconductor

A novel magnetic sensor is developed by utilizing the magneto-resistive effect of  $Y_1Ba_2Cu_3O_{7-x}$  ceramic superconductor. It shows a very high sensitivity at a weak magnetic field, in both digital and analog modes. This magnetic sensor has many advantages over the conventional semiconductor magneto-resistive sensor.

## 1. Introduction

Since Bednorz and Müller<sup>(1)</sup> discovered the existence of superconductivity up to 35 K in the La-Ba-Cu-O compound system, activity has increased in the research and development of ceramic superconductors and great efforts have been directed toward the realization of higher  $T_c$ , higher  $J_c$  and higher  $H_c$  values. Superconductivity is now found in Y-Ba-Cu-O compounds at temperatures higher than 77 K.<sup>(2)</sup>

We are interested in the utilization of an effectively low threshold value of the magnetic field to break the superconductivity of a Y-Ba-Cu-O ceramic superconductor. It is found that the superconductivity of a certain material can be broken by a very weak magnetic field to show an abrupt increase in the resistance with a magnetic field.

## 2. Sample Preparation

An Y-Ba-Cu-O film was prepared by the spray pyrolysis method<sup>(3)</sup> on a sheet of