

Electromagnetic properties of Co / Si / Co tunneling junction

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1. Introduction

In recent years, Ferromagnet/Insulator(Semiconductor)/Ferromagnet junctions have been studied in order to clarify the effect of tunneling through the insulating(S) barrier. And this has received attention. That is because these layers are expected to offer wide opportunities as magnetic sensors or magnetic heads and so on.^[1 2] Here we present a study of Co/Si/Co structures, I-V characteristics and MR behavior for tunneling through the junction with varying the thickness of silicon and controlling temperature.

2. Experimental

The tunneling junctions were grown on a glass substrate by using a thermal evaporator. Tantalum mask was utilized for the cross construction of two ferromagnetic electrode layers and a Si barrier layer. The junction has an active area of 0.04mm². Structure, Thickness, I-V characteristics and MR ratio was estimated by XRD, Interferometer, I-V tester and MR technique.

3. Results and discussion

From this study, we obtained the result that the tunneling current increases exponentially with increasing the voltage and a different MR effect is obtained, which is related to the Si thickness, the spin structure of Co and the temperature.

[Reference]

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