Sensors and Materials, 2, 4 (1991) 207–216
MYU, Tokyo

S & M 0051

Polycrystalline Silicon Carbide Films for Piezoresistive Elements

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(Received March 13, 1990; accepted August 20, 1990)

Key words: thin film, silicon carbide, sensor, piezoresistance, plasma CVD, polycrystal

The experimental results regarding to the preparation and the characterization of crystalline SiC films as well as electrical properties including the piezoresistive effect have been reported in this paper. Polycrystalline SiC films were prepared on insulating substrates by plasma enhanced chemical vapor deposition (plasma-CVD) and characterized by X-ray diffraction, transmission electron diffraction and Auger analysis. It was found that polycrystalline SiC films were obtained above substrate temperatures of 600°C, and doping of a small amount of boron was effective in increasing the grain size and improving the thermal coefficients of resistance. The piezoresistive effect of the film was measured. The maximum value of the gauge factor was about 20, and was the same as that of boron-doped polycrystalline silicon thin films.

1. Introduction

Recently, many studies have been carried out on amorphous,[1–7] polycrystalline and single-crystalline[8–18] SiC film growth because of its excellent properties, such as high resistance against temperature and chemicals, and many potential applications to electronic devices. However, there are few applications which are in practical use.

In general, strain gauges using semiconductors have higher sensitivity as compared with conventional metal strain gauges. Pressure sensors with SOISS (semicon-