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非晶态Ni-Si-B合金薄膜的电阻温度系数和稳定性

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TEMPERATURE COEFFICIENT OF ELECTRICAL RESISTANCE AND STABILITY OF AMORPHOUS Ni-Si-B ALLOY FILMS

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摘要

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摘要 一、前言 利用非晶态薄膜制做敏感元件用于传感器或制做精密电阻器用于微电子线路,具有电阻率大、电阻温度系数低、抗腐蚀、耐磨、体积小和一体化等优点。非晶态材料的稳定性是此材料技术应用上所需解决的问题之一。从对Ni-Si-B非晶薄膜的研制和测试中发现,薄膜的物理性质及稳定性除与溅射条件,退火处理有关外,还与薄膜的厚度有关。一定厚度范围的薄膜有最小的电阻温度系数(TCR)和最好的稳定性。从薄膜结构弛豫激活能的测定中也得到一定厚度范围的薄膜对应较大的激活能(E_a)。

关键词:

Abstract: This paper presents the studies of electrical sheet resistance (R_s , Resistance per square area of the film) and its temperature coefficient (TCR) and also the relation between R_s and TCR of the amorphous Ni-Si-B in the temperature range from 50 to 360°C. The relaxation activation energy (E_a) is calculated utilizing the slope ratio method. The experimental results show that TCRs have the smallest value $\pm (10^{-6} \sim 10^{-5}) K^{-1}$, when R_s are between 80 to 550 ohm/square-area (Ω/\square). Films in this range of R_s have better stability and high E_a . TCRs of the films with $R_s < 80 \Omega/\square$ are all positive, TCRs of those with $R_s > 550 \Omega/\square$ are all negative, the larger the R_s the greater the absolute value of its TCR, and the smaller the E_a .

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