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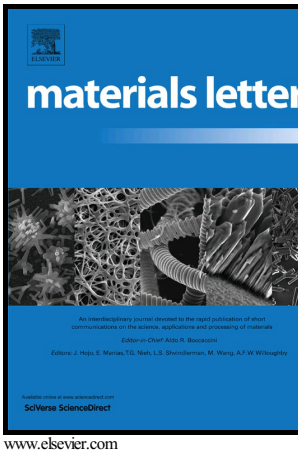

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Preparation of ScAlN film on Hastelloy alloys under different sputtering power

Yixi Yang[1, 2,*], Dong Zhou[1,2], Chengtao Yang[1,2], Fan Feng[1, 2], Junsong Yang[1, 2], Qijun Hu[1,2]

1. University of Electronic Science and Technology of China, UESTC, Chengdu, 610054, China
2. State key laboratory of Electronic Thin Films and Integrated Devices, Chengdu, 610054, China

*Email: 15008215455@163.com

*tel: 15008215455

Abstract: Piezoelectric film based on flexible substrate, which is conductive and heat-proof, is very promising for cantilever beams to constitute vibration energy collectors. Sc-doped AlN thin films based on Hastelloy alloys flexible substrate were prepared by DC reactive magnetron sputtering under sputtering power from 110 W to 200 W. The crystal quality of ScAlN films was investigated. Results show that the sputtering power extremely influences the preparation of c-axis-oriented ScAlN thin films. The crystal quality first increases and then decreases with increase of sputtering power, reaching the best crystalline state at 170 W, presenting full width at half maximum of 2.3°.

Key words: ScAlN, Crystal structure, Piezoelectric materials, Power, Flexible substrate, Cantilever

Introduction

Global energy shortage prompts the development of various clean and green energy systems to help tackle the issue. The energy of vibration among all the clean energy is generated very universally in the human environment. So, exploitation of vibration energy by means of vibrating cantilever beam seems to be very valuable [1-7]. To obtain greater vibration and lighter weight, piezoelectric films deposited on flexible substrate have been investigated, which opens a new area of research for a wide range of applications. Few investigators have reported flexible substrate of polyimide [8, 9]. However, these polymer-type flexible substrates suffer from disadvantages such as they could not withstand higher temperatures, and a bottom metallic electrode layer