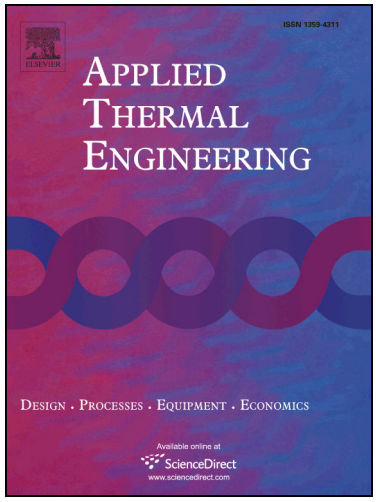

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Multi-layered microwire with a bi-metal tip for thermoelectric applications

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Abstract

A multi-layered microwire for thermoelectric applications was fabricated. This was made by depositing a thin Al layer on a 100 μm diameter Fe core, and a bi-metal tip was created at one end of the wire. A thermoelectromotive force was successfully generated by applying different temperatures to each end of the wire. The sign of the thermoelectromotive force changed depending on to which end the higher temperature was applied. The Seebeck coefficient of the fabricated, multi-layered microwire was measured to be 1.96 μV K^{-1}.

Keywords: Seebeck effect, Thermoelectromotive force, Fe, Microwire, Al

1. Introduction

Thermoelectric phenomena, such as the Seebeck and Peltier effects, occur at bi-metal junctions, and many devices with bi-metal junctions or interfaces have been proposed for various kinds of thermoelectric applications [1-12]. The phenomenon of generating electricity from a temperature difference is known as the Seebeck effect and this principle is used in thermocouples for temperature measurement. Moreover, the Seebeck effect has recently been attracting considerable attention as a means for generating clean energy [1-9]. In a simple thermoelectric circuit, where the ends of two, dissimilar metal wires are connected together, a voltage, known as the thermoelectromotive force, appears due to the temperature difference