

MD.102.

Title

Technology of oriented growth of anisotropic single-crystal Bi films in a strong electric field.

Authors

Leonid Konopko, Albina Nikolaeva, Ana Kobyljanskaya,
Gheorge Para

Institution

**Ghitu Institute of Electronic Engineering and
Nanotechnologies, Chisinau MD-2028, Moldova
Republic of**

INTERNATIONAL EXHIBITS

231

EUROINVENT 2021

Patent no.

The patent has been prepared for submission.

The invention relates to the field of materials science and nanotechnology, and more precisely to the possibilities of obtaining single-crystal Bi films with predetermined parameters. The objective of the invention is to develop a technology for recrystallization of thin Bi films with the final aim to obtain the necessary orientation of the main crystallographic axis C_3 of the film. The proposed method is based on our patent on the recrystallization of a glass-coated bismuth microwire in a strong electric field (Patent No.MD 1409 Y 2019.12.31). The anisotropic heat flux sensor manufactured using this technology had a high sensitivity (10^{-2} V/W), but the glass coating greatly increased the time constant ($\tau = 0.5$ s). Another anisotropic heat flux sensor architecture based on the film technology will reduce the time constant by about 4 orders of magnitude. In the proposed technology, a Bi film deposited on a thin glass substrate is placed inside a capacitor consisting of a glass plate coated with a semitransparent conductive layer and a copper plate. A strong electric field is created inside the capacitor, $E = 8 \times 10^3$ V/cm. A moving focused laser beam melts the bismuth film pointwise; in the air flow, the melted regions crystallize with the direction of the main crystallographic axis C_3 of the film in the direction of the electric field. The proposed recrystallization technology in a strong electric field is the main and necessary component in the creation of anisotropic thermoelectric energy converters based on a single-crystal Bi films.

Description

EN

Class no.