РОССИЙСКАЯ ФЕДЕРАЦИЯ

ПАТЕНТ

НА ИЗОБРЕТЕНИЕ

№ 2303834

ТЕРМОЭЛЕКТРИЧЕСКИЙ ГЕНЕРАТОР (ВАРИАНТЫ) И СПОСОБ ИЗГОТОВЛЕНИЯ ТЕРМОЭЛЕКТРИЧЕСКОГО ГЕНЕРАТОРА

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Description of the invention to the patent

Application 2005120519/28, 22.06.2005 Date of origin of the patent term 22.06.2005 Published 27.07.2007	Authors: Kaminskii Vladimir Vasil'evich (RU) Golybkov Alexandr Vasil'eich (RU) Kazanin Mikhail Mikhailovich (RU) Pavlov Igor Vladimirovich (RU) Solov'ev Sergey Mikhailovich (RU) Sharenkova Natalia Viktorovna (RU)

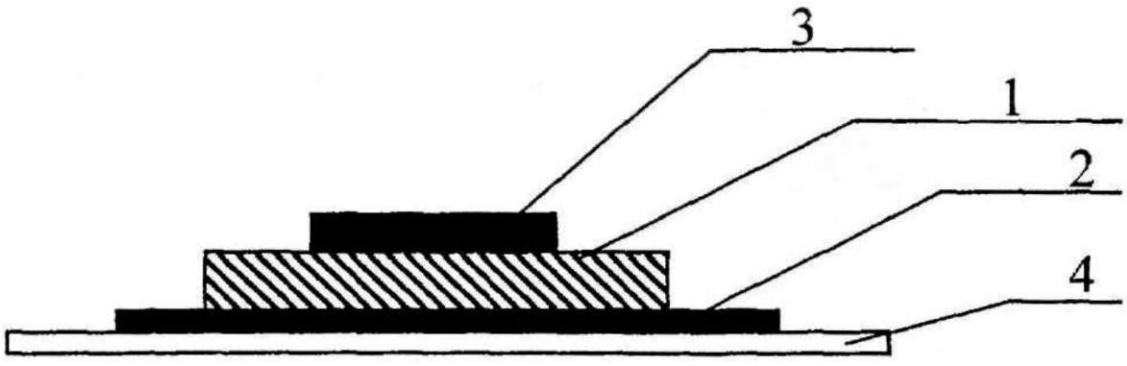
THERMOELECTRIC GENERATOR (OPTIONS) AND WAYs OF PRODUCTION OF A THERMOELECTRIC GENERATOR

Abstract

The invention relates to the area of converting of thermal energy into electrical on the basis of semiconductor thin-film structures.

Gist: thermoelectric generator contains polycrystalline layer of semiconductor material which is placed between metal contact pads. Mentioned layer has the following composition Sm1+xS, where $0< x \leq 0,7$ and where x varies monotonically in the perpendicularly direction to the boundary surfaces of the layer from one contact pad to another. Way of thermoelectric generator production includes polycrystalline semiconductor layer deposition by discrete vacuum evaporation on a heated metal surface of the substrate. The substrate is the first contact pad. Deposited layer has an initial composition of samarium sulfide. During the sputtering process the substrate temperature is being monotonically increased from the initial to the final value. Values are selected from the temperature range from 250 to 600°C. The second contact pad is connected to the surface of the mentioned obtained layer.

Technical result: possibility to work without gradient of temperatures at high electromotive force.



Claims

1. The thermoelectric generator, which comprises a layer of polycrystalline semiconductor material on the basis of 3rd group element and contact pads. It has the following distinctive feature:

- the mentioned layer is placed between the contact pads
- it has a composition in the form of samarium sulfide $Sm_{1+x}S$, where $0<x<0.17$
- x is steadily changes in the direction perpendicular to the boundary surfaces of the layer from one contact pad to another.

2. According to the first point the thermoelectric generator has the following distinctive feature: one of the mentioned contacts is sputtered on the dielectric substrate.

3. The thermoelectric generator includes at least one element consisting of polycrystalline layer of semiconductor material based on the 3rd-group element and contact pads. The thermoelectric generator excels in the fact that the mentioned layer is placed between contact pads and has a composition in form of samarium sulfide $Sm_{1+x}S$ where $0 <x <0.17$. X is steadily changes in the direction perpendicular to the boundary surfaces of the layer from one contact pad to another. The generator contains two mentioned equal elements. Whereas two contact pads, which are connected to layers' boundary surfaces of each element having either minimum or maximum concentration of samarium sulfide, are electrically connected. Output electric signal is measured from two free contact pads of the mentioned elements.

4. According to the third point the thermoelectric generator has the following distinctive feature: the mentioned electrically connected contact pads are sputtered at least on one dielectric substrate.

5. Method of manufacturing a thermoelectric generator contains sputtering of semiconductor material polycrystalline layer on based on the 3rd-group element by discrete evaporation in vacuum on the heated substrate and connection of the contact pads. Method excels in the fact that powder of samarium sulfide is taken for a basic material for the mentioned sputtering. The substrate is made with metal surface which is the first contact pad. The substrate temperature is steadily increased from the initial to finite value during the sputtering of the layer by discrete evaporation. The temperatures are chosen from the range of temperatures from 250 to 600 ° C. The second contact pad is connected to the surface of the mentioned layer.