

課題番号 : F-21-TU-0027
 利用形態 : 機器利用
 利用課題名(日本語) : MEMS/NEMS fabrication
 Program Title (English) : MEMS/NEMS fabrication
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1. 概要(Summary)

To achieve high performance of TEG, besides the improving performance of thermoelectric materials, an increasing number of thermoelectric legs of the TEG can enhance the electric output power. Hundreds of n and p type thermoelectric legs could be formed on a small footprint by employing micro/nano technologies, which makes the output power of the micro-TEG higher. However, micro/nano fabrication of the micro-TEG shows some problems, including difficultly constructing the air bridge between two thermoelectric legs, complex fabrication processes, poor bonding connections (substrate and thermoelectric legs), requiring heat treatment processes (effects to performance of thermoelectric materials), limiting the height of thermoelectric legs. As a result, the output power of micro-TEG is small. Herein, micro-TEG with a high integration density using a high performance electrodeposited thermoelectric material is fabricated by an assembly technology which is simple, low cost, and green process. In addition, potential for self-powered wearable electronic devices employing the fabricated TEG is demonstrated.

2. 実験(Experimental)

【利用した主な装置】

- 住友精密 TEOS PECVD 装置
- DeepRIE 装置#1
- メタル拡散炉
- 熱電子 SEM
- 両面アライナ露光装置一式(両面アライナ、スピコンコータ、オープン、現像機、乾燥機)

【実験方法】

Micro-TEG is fabricated by assembly technique.

3. 結果と考察(Results and Discussion)

High density micro-TEG has been fabricated successfully.

The fabricated device shows a high performance which has high potential for self-powered wearable electronic device.

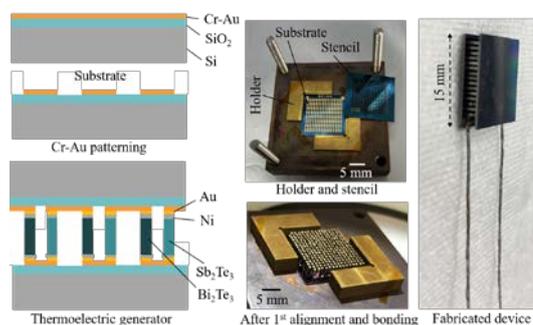


Fig. 1. Fabrication process and fabricated result.

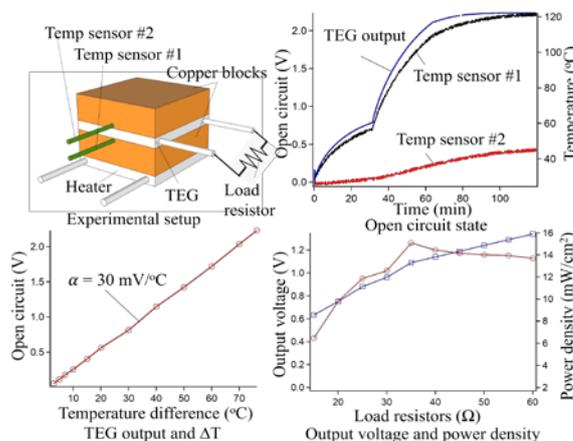


Fig. 2. Evaluated result

4. 論文・学会発表(Publication/Presentation)

1. N.V.Toan, T. T. K. Tuoi, N. V. Hieu and T. Ono, "Thermoelectric generator with a high integration density for portable and wearable self-powered electronic device", *Energy conversion and management*, 245, 114571, 2021.

5. 論文・学会発表(Publication/Presentation)

なし

6. 関連特許(Patent)

なし