

# Accepted Manuscript

High-performance self-powered wireless sensor node driven by a flexible thermoelectric generator

Yong Jun Kim, Hyun Mo Gu, Choong Sun Kim, Hyeongdo Choi, Gysoup Lee, Seongho Kim, Kevin K. Yi, Sang Gug Lee, Byung Jin Cho



PII: S0360-5442(18)31596-2

DOI: [10.1016/j.energy.2018.08.064](https://doi.org/10.1016/j.energy.2018.08.064)

Reference: EGY 13540

To appear in: *Energy*

Received Date: 21 February 2018

Revised Date: 29 June 2018

Accepted Date: 8 August 2018

Please cite this article as: Kim YJ, Gu HM, Kim CS, Choi H, Lee G, Kim S, Yi KK, Lee SG, Cho BJ, High-performance self-powered wireless sensor node driven by a flexible thermoelectric generator, *Energy* (2018), doi: 10.1016/j.energy.2018.08.064.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 **Article type: Full length article**

2  
3 **High-performance self-powered wireless sensor node driven by a flexible thermoelectric**  
4 **generator**

5  
6 Yong Jun Kim, Hyun Mo Gu, Choong Sun Kim, Hyeongdo Choi, Gysoup Lee, Seongho  
7 Kim, Kevin K. Yi, Sang Gug Lee and Byung Jin Cho\*

8  
9 Yong Jun Kim, Hyun Mo Gu, Choong Sun Kim, Hyeongdo Choi, Gysoup Lee, Seongho  
10 Kim, Prof. Sang Gug Lee and Prof. Byung Jin Cho  
11 School of Electrical Engineering, Korea Advanced Institute of Science and Technology  
12 (KAIST), 291 Daehak-ro, Yuseong-gu, 34141, Daejeon, Republic of Korea  
13 E-mail: elebjcho81@kaist.ac.kr

14  
15 Dr. Kevin K. Yi  
16 Tegway Co. Ltd., #711 National Nano Fab. Center (NNFC), 291 Daehak-ro, Yuseong-gu,  
17 34141, Daejeon, Republic of Korea

18  
19 Keywords: Flexible thermoelectric generators, energy harvesting, self-powered, wireless  
20 sensor nodes, fill factor, flexible TEG optimization

21  
22 **Abstract**

23 As industrial environments expand and become more automated, wireless sensor networks  
24 are attracting attention as an essential technology for efficient operation and safety. A wireless  
25 sensor node (WSN), self-powered by an energy harvester, can significantly reduce  
26 maintenance costs as well as the manpower costs associated with the replacement of batteries.  
27 Among the many studies on energy harvesting technologies for self-powered WSNs, however,  
28 the harvested power has been too low to be practically used in industrial environments. In this  
29 work, we demonstrate a self-powered WSN driven by a flexible thermoelectric generator (f-  
30 TEG) with a significantly improved degree of practicality. We developed a large-area f-TEG  
31 which can be wrapped around heat pipes with various diameters, improving their usability and  
32 scalability. A study was conducted to optimize the performance of the f-TEG for a particular  
33 WSN application, and an f-TEG fabricated with an area of  $140 \times 113 \text{ mm}^2$  harvested 272 mW  
34 of energy from a heat pipe at a temperature of  $70^\circ\text{C}$ . We also tested a complete self-powered  
35 WSN system capable of the remote monitoring of the heat pipe temperature, ambient  
36 temperature, humidity,  $\text{CO}_2$  and volatile organic compound concentrations via LoRa

Download English Version:

<https://daneshyari.com/en/article/8070787>

Download Persian Version:

<https://daneshyari.com/article/8070787>

[Daneshyari.com](https://daneshyari.com)