# Flexible Organic Thermoelectric Devices Considering Anisotropicity

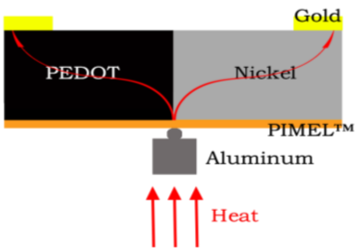
筑波大 [1], 産総研 [2], JST さきがけ [3] ○(M2) 王雨卿 [1,2], 向田　雅一 [2], 桐原　和大 [2], 堀家　匠平 [2,3], 張　振亜 [1], 衛　慶碩 [2,3]

Univ. Tsukuba[1], AIST[2], JST PRESTO[3], °(M2)Yuqing Wang[1,2], Masakazu Mukaida[2], Kazuhiro Kirihara[2], Shohei Horike[2,3], Zhengya Zhang[2,3], Shohei Horike[2]

E-mail: ou.colin8630114@aist.go.jp

The feasibility of using organic thermoelectric devices to power sensors for different applications is a critically encouraging factor for researchers. Organic semiconductors possess lower thermoelectric performance than their inorganic counterparts; however, these can be compensated with certain advantages such as their lightweight, low fabrication cost, and low fabrication temperature.[1]

Anisotropicity in the materials needs to be considered while fabricating flexible devices. Such that the heat flow is transferred from a vertical direction to a horizontal direction (Figure 1). This concept is known in the field of inorganic thermoelectrics but is not generally applied in organic materials. Here, we report the fabrication of organic thermoelectric devices on a thin, flexible polyimide substrate using poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT: PSS). The PEDOT film is first coated on polyimide and then patterning using laser cutting technology. When the device was placed on a hot source, the vertical heat flow transferred to a horizontal direction. The film thickness and the size of each leg are optimized combined with theoretical simulation.



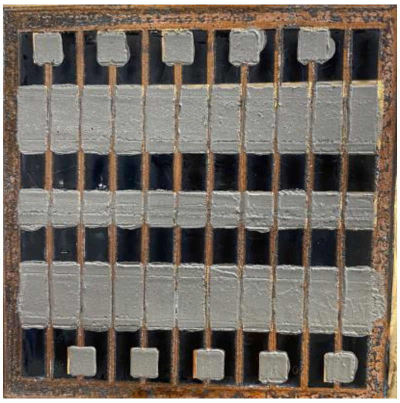



**Figure 1.** Schematic and picture of a flexible device transfering the heat flow from a vertical direction to a horizontal direction.

## Reference

M. Mukaida, K. Kirihara, S. Horike and Q.S. Wei, *J. Mater. Chem*. A, **2020**, 8, 22544.