

微小エネルギーを利用した革新的な環境発電技術の創出
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伝導性ポリマーによる熱充電可能な電気化学セルの創成

§ 1. 研究成果の概要

Low-grade waste heat can be harvested using electrochemical cells. However, the high cost of usually used platinum electrode limits its application. In this year, we report that the Poly (3,4-ethylene dioxythiophene)/poly (styrene sulfonate) (PEDOT/PSS) film is considered to be an attractive alternative to a platinum electrode, which shows an even lower charge transfer resistance. Using ferricyanide/ferrocyanide as an electrolyte, the PEDOT/PSS based thermo-electrochemical cell with a size of 5 cm × 5 cm × 2 cm shown a maximum power out of 300 μ W with 1 Ω loading at a temperature difference of ca. 30 K, which is good enough to drive light emitting diodes array and Bluetooth humidity/temperature sensors for wireless communication. Furthermore, PEDOT/PSS shows the advantage of hybrid insoluble redox couples such as Prussian blue analog materials, which makes it easy to study the temperature-dependent redox potential of different materials. By a combination of proper redox couples, the thermally regenerative electrochemical cells could realize. The power could generate during the environmental temperature change; however, a maintained temperature difference between different electrodes is not necessary for these cells.

§ 2. 研究実施体制

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- ② 研究項目
 - ・伝導性ポリマーによる熱充電可能な電気化学セルの創成