

**Centre National de la Recherche Scientifique (CNRS)**

University of sciences and technologies of Lille, BP 60069, avenue Poincaré,  
F-59652 cedex, Villeneuve d'Ascq, France

**Post-Doctoral Offer:**

**Electrical and thermal characterizations of thermoelectric polymers  
at the nanoscale by local probe microscopy  
for the development of autonomous sensors**

**Workplace:** Institut d'Electronique, de Microélectronique et de Nanotechnologies (<http://www.iemn.fr>), Lille

**Contract Period:** 1 year

**Remuneration:** From 2555 to 2948 euros gross salary per month

**Desired level of education:** Ph. D

**Experience required:** 1 to 4 years

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**Work Context:**

The Harvesters project funded by the National Research Agency over the period 2017-2020 in partnership with the CEA-LITEN, CEA-INAC and ID3 Technologies, aims to develop an energy source based on thermoelectric polymers for autonomous sensors. Thermal energy is abundant in our environment but materials currently used for thermoelectric conversion (or generation of electricity from a heat flow) at room temperature are toxic and unabundant on Earth. Polymer materials are very promising: their thermoelectric properties are beginning to become interesting and they are compatible with large surface printing techniques on flexible surfaces.

**Activities:**

In order to improve the properties of these new thermoelectric polymers, this project study the relationship between micro/nanostructures and thermoelectric properties in thermoelectric polymers based on poly(3,4-ethylenedioxythiophene) - PEDOT. Scanning probe microscopies allow us to characterize locally the electrical conductivity (by Conducting Atomic Force Microscopy) as well as the thermal properties (by Scanning Thermal Microscopy). These properties measured at the nanoscale are related to the organization of the material. Indeed, the relationship between thermoelectric properties (Seebeck coefficient) and structure organization is not well known to date.

In this study, we will characterize, develop and select the most promising materials to be used at CEA-LITEN in Grenoble, for the development of flexible thermoelectric generators to power autonomous sensors.

**Skills:**

This Post-Doc offer is for a candidate with a strong interest for experimentation and with an experience in scanning probe microscopy (ideally Conducting Atomic Force Microscopy or Scanning Thermal Microscopy). Skills in materials science (especially polymer) and electronics are an advantage for this offer. For this multidisciplinary subject, at the interface between chemistry and physics, the candidate will have to manage electrical and thermal characterizations, as well as the development of new characterization systems.