

**Project 6.4 A study of always-active, distributed and ubiquitous energy sources as applied to power Internet of Things (IoT) nodes.**

**Supervisor:** prof. dr hab. inż. Tomasz Skotnicki / dr inż. Maciej Haras

**Institute:** Institute of High Pressure Physics PAS

**Unit:** Terahertz Laboratory NL-11/ CENTERA

**www:** [www.centera.eu](http://www.centera.eu)

**Background:**

The research problem concerns an in-depth study of a specific ubiquitous and sustainable energy source and a cooperating micro-generator / energy detector. Such a generator/detector will require neither (explicit) contact with the source nor installation on the source, which will be a huge improvement. For example, a photovoltaic cell needs to be directed to light, a Seebeck generator to physically contact a heat source, and a vibration generator to be attached to a vibrating object. In addition, neither of these sources is ubiquitous or permanent. The new generator/ detector will work anytime, anywhere. The research will be conceptual, theoretical, simulation and experimental. Depending on the efficiency of the consumption of energy from the source, applications for electricity generation or, in case of insufficient capacity, for acquiring useful information based on measuring the amount of energy received will be considered. The research will be carried out at IMiO and at CENTERA Labs.

**Aim:**

Supply of detectors, including THz in self-supplying systems.

At the moment, the IoT market is the fastest growing electronic market. Due to the huge (trillions of nodes) number of sensors that work and will work in IoT network nodes, their battery or cable power supply is in practice impossible. As a consequence, the development of the IoT network is hampered today by the lack of the possibility of self-supplying. Existing power generators only partially meet the expectations as they are limited to a specific energy source. Therefore we will look for generators and sources that work always and everywhere.

**Requirements:**

- physics, electronics, cleanroom work experience,
- simulation skills, incl. Comsol,
- experience in conducting experiments in the field of Energy Harvesting