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Institut d'Electronique, de Microélectronique et de Nanotechnologie
UMR CNRS 8520

Master and Engineer Internship: 2020-2021

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Title : **Microstructuration impact on the properties of a polymer membrane for thermal comfort in textile**

Abstract :

We are interested in a new generation of textiles able to dynamically regulate temperature from its physical nature and its intrinsic structure.

The goal is to control the thermal comfort of textiles when it is subjected to external stimuli. Thermal comfort is connected to the space between the skin and the textile, called microclimate. This latter can be strongly degraded if the equilibrium between temperature and humidity is not maintained. The goal is to understand and control the balance and the thermal comfort of the microclimate by the dynamic adaptation of the optical properties of the textile in its environment.

The work will consist of studying the interaction of electromagnetic waves with a polymer membrane, either microstructured in photonic crystal or charged with particles, in the MIR domain (5-15µm), corresponding to the radiation of the human body. Photonic crystals are artificial structures with a periodic modulation of their refractive index to control the propagation of electromagnetic waves at the wavelength scale. A finite element (FEM), membrane fabrication in IEMN clean room and experimental FTIR study will be conducted with respect to the properties of dispersion, transmission, absorption and reflection.

This work is part of the European Interreg PHOTONITEX project (2018-2022).

References:

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