

Nanomaterials and nanotechnologies for a sustainable future

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Optics plays an important role within the fields of nanosciences and nanotechnologies. Extensive work carried out in near-field optics in the 1990s led to the birth of a new and dynamic branch of optics, known as nano-optics. This booming field deals with the understanding, control and exploitation of light-matter interaction at the nanometer scale (i.e. on a scale much smaller than the wavelength of the electromagnetic field involved). The ability to observe, manipulate, and structure light at this scale opens up a vast potential for research and new applications.

Keywords: light, nanomaterials, nanotechnologies, nanosciences.

I. INTRODUCTION

The laboratory Light, nanomaterials and nanotechnologies (L2n) aims at the development of nano-optics, which addresses a number of technological, scientific and socio-economic challenges. The L2n is a joint UTT/CNRS laboratory of more than 100 people comprising faculty members, research and project engineers, technicians, post-doctorate fellows PhD students, graduate students and visitors. Researchers at the L2n work on new concepts and approaches, developing both innovative instrumentation and nanocharacterization and nanofabrication methods. Covering such fields as energy (lighting, photovoltaics, etc.), telecommunications, data storage, health and security, key socio-economic challenges are addressed through multidisciplinary research focus areas: plasmonics, integrated optics, optoelectronics, new spectroscopies and microscopies, multiphysics modeling, multi-functional nanosensors, nanobiophotonics and nanomaterials for photonics, quantum nanodevices, photochemistry and photophysics.

The L2n possesses 1000 m² of laboratory space including 700 m² in clean rooms. The facility platform associated and managed by the L2n is the platform Nano'mat. Nano'mat is part of the CNRS national network of technological platforms RENATECH. See here for more information about the platform.

Specifically in this presentation, we will show the L2n activities related to sustainability and in particular the various efforts in the synthesis of new (nano)materials which are easy to produce and abundant for various applications but also new methods of physical approaches to fabricate large-scale nanostructured materials for applications in telecommunications, energy efficient systems, security or health. We will give some examples of projects on sustainable systems where the L2n is involved such as the project 'Recycled' on recycling LEDs but also some projects regarding the development of filters and storage of lithium for batteries but also on the recycling of materials coming from batteries such as graphite to produce graphene or carbon dots.