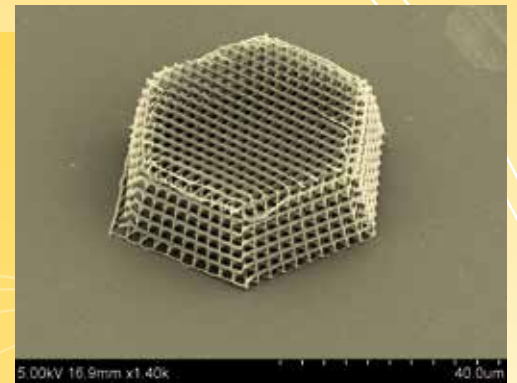


Research activities at LPQM are devoted to light-matter interactions in molecular media. Its multiscale and multidisciplinary approach, from material engineering to imaging and tracking of nanoscale objects in cell media, rests on a pioneering background in photonics as well as in the development of fabrication and testing technologies with emphasis on light confining structures at the micrometer and quantum properties at the nanometer scales. Applications in the domain of multiphoton imaging with polarization analysis, nanoplasmonics and nanothermics, microlasers, photonic devices for optical communications or biosensors are currently being developed in this context.

This evolution is strongly supported by internal research projects and by the use of the clean room funded by the D'Alembert Institute. LPQM is also a Laboratory of Ecole Centrale de Paris which hosts and supports one of its research teams.



SEM image of a chiral structure fabricated on SU8 negative photoresist by the LOPA based direct laser writing technique (Ngoc Diep Lai).

Research fields

The laboratory is a joint CNRS-ENS de Cachan research unit structured around three highly cross-linked research projects in the following areas:

- Micro- and nanostructures for optical signal processing and sensing applications: from materials to devices.
- Molecular Nanophotonics: Multiphoton optical manipulation and Imaging for Biology.
- Nanophotonics and Nanothermics using plasmonic nanostructures for application in biology and devices.

Techniques

- Laser sources (cw, nano, pico, femtosecond regimes) for various experimental set-ups: degenerate 4-wave mixing, mono and multiphotonic confocal microscopes.
- An "Electro-optical microscope" for the study of biological membranes potentials, according to an original, LPQM- patented set-up.
- Characterization benches for the investigation of passive and active components for optical signal processing (electro-optic modulators, microlasers, biosensors) and related tools (e.g. spectroscopy ellipsometer, platform for measurements of microscopic non linearities).

Scientific outcome :

LPQM publishes around 25-30 original papers in international journals per year for 10 scientists. Three PhD theses are defended per year. Lab members participate in various international conferences and meetings, giving about 10 invited talks and 40 oral or poster communications per year. The lab is involved in various international projects, especially with the University Paris-Saclay (RTRA Triangle de la Physique, LabEx PALM, LaSIPS and NanoSaclay), Partenariats Hubert Curien, International CNRS projects.

Partnerships :

LPQM has an extensive network of national, European and international partnerships (as Georgia Tech in the USA, LMU Munich Germany, EPFL Lausanne Switzerland, Milano University and Institute of Cybernetics - Pozzuoli, Italy, University of Science and Technology of Hanoi, Vietnam, NTU and CCU Universities in Taiwan) allowing the setting up of projects, student exchange and PhD thesis shared between LPQM and other institutions. Through European Associate Laboratory (LEA) "NaBi", LPQM and D'Alembert Institute collaborate with Weizmann Institute (Israel), ENS Paris and Fresnel Institute.

Key figures :

