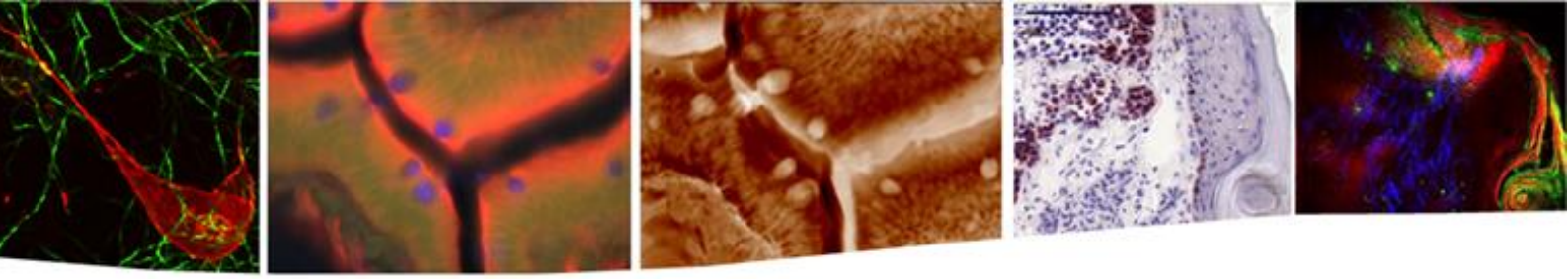


Biological Imaging

A technological platform dedicated to provide innovative optical solutions to researchers working in the field of life sciences.

The platform gathers a variety of optical microscopy tools to perform imaging and single molecule analysis.

Available techniques

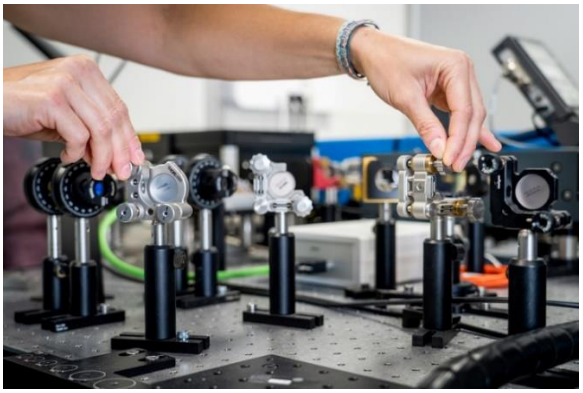
- **Quantitative phase microscopy**
  Label-free contrast - Images give the local optical thickness distribution of the sample (transmission wide-field microscopy).

- **Polarization-resolved microscopy**
  Controlling light polarization to probe orientation of single molecules and organization of biomolecular assemblies (fluorescence / nonlinear contrast).

- **Fluorescence correlation spectroscopy**
  Fluorescence intensity fluctuations in a femtoliter volume provides information about molecular diffusion, molecular concentration and molecular associations (FRET)

- **Coherent Raman (CARS/SRS) microscopy**
  Molecular spectroscopy - molecular organization imaging in biological tissue and soft matter – chemical mapping – metabolic imaging

- **Nonlinear (2photon, SHG, THG) microscopy**
  Using ultrashort laser pulses for molecular imaging of cells and tissues. Can be used for in-depth imaging, and/or label-free imaging.



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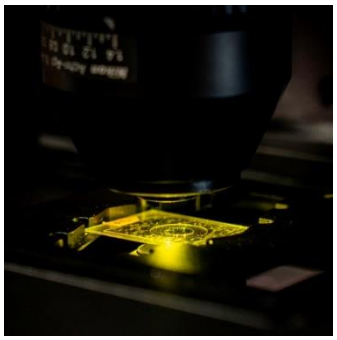

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Most of the instruments used were **developed in-house**. They are therefore **open and modular**, allowing them to be adapted to all types of samples and to consider specific studies, **conducted by the designers themselves**.
We also can **handle living samples**, including **mammalian cell culture** in a L2 facility.

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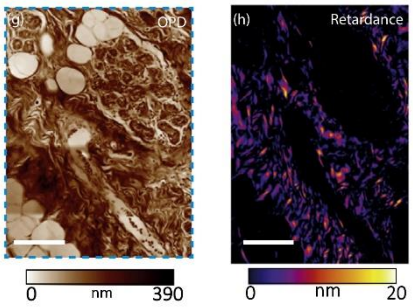
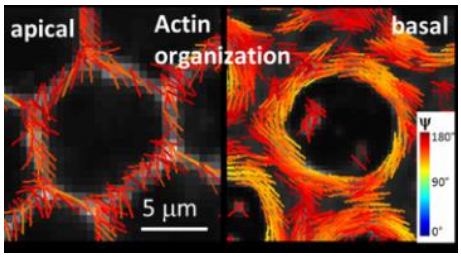
Available measurements / examples

- **Quantitative phase imaging** - Dry mass monitoring of living cells (over hours or days) - Optical retardance imaging - specific image of collagen fibers – constraints in solid materials



Advanced stage of tumoral mouse skin slice tissue. Aknoun et al. Opt. Comm.

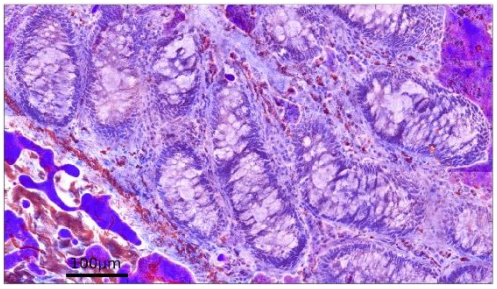
- **Probing orientational order of biological molecules** – Orientation of C-H bonds in mouse myelin – Actin filaments organization -



Mavrakis et al. Nat. Cell Bio (2014)

- **Chemical imaging** – Mapping drug distribution in pharmaceutical products – Drug penetration in tissues (skin / hair) – Lipid imaging - metabolic imaging with deuterated molecules.

- **Tissue morphology / architecture** – Myelin organization – developmental biology – cancer tissues – Lipid distribution



False colors image of a label-free frozen section of healthy human colon. Spatial map of proteins (blue) and lipids (pink), and collagen (red). Image total acquisition time 15 minutes.
Audier et al. Optics Exp. (2020)

- **Single molecule fluctuation dynamics** – conformational modulations – FRET analysis – Measurement of hydrodynamic radii of proteins -

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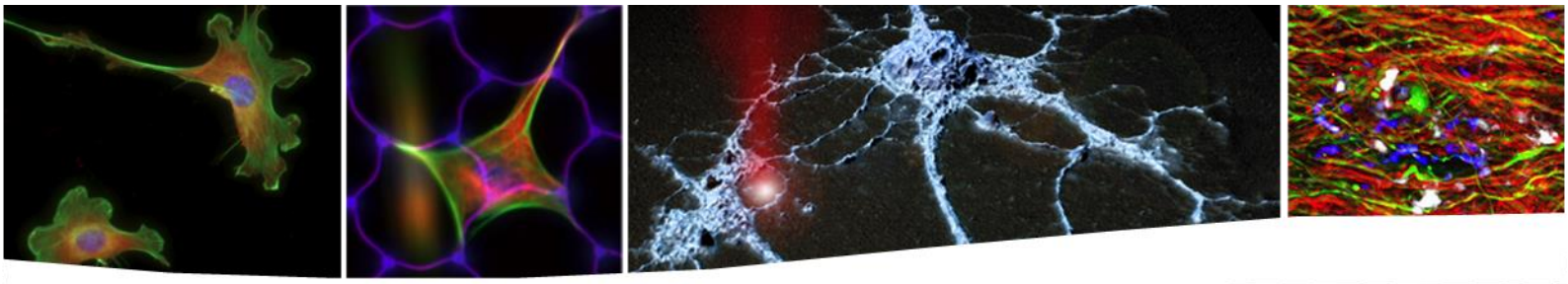

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