



Title : Super-resolution microlens array imaging for biomedical application

Supervisors :

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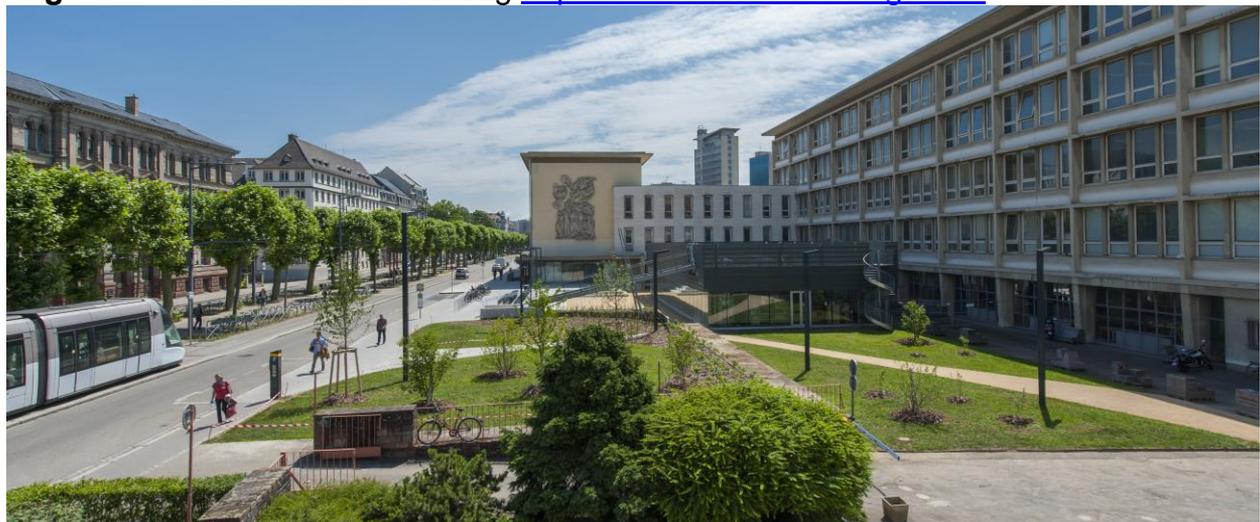
Lab:

ICube Research Institute, INSA de Strasbourg, University of Strasbourg

Photonics Instrumentation and Processes team (IPP)

<http://icube-ipp.unistra.fr/>

Organisation: INSA de Strasbourg <http://www.insa-strasbourg.fr/en/> since 1875



Collaborations:

WNLO (China), IRCAD, IREPA LASER, Qiova

IRCAD in Strasbourg is a research institute against digestive cancer world renowned fame as a leading research and education institute.

<https://www.ircad.fr/the-institute/>

Abstract:

Many of the recent progresses in biomedical engineering are strongly related to the development of the imaging methods. Optical imaging techniques are non-contact methods, easy and fast to apply for diagnosis and biological sample observations. However their resolution has been for a long time limited by diffraction. With techniques such as PALM and STED, the optical resolution has been improved far beyond the Abbe limit, making it possible to resolve down to 10 nm. However, the use of specific toxic dyes with these techniques is an issue, motivating the development of label free techniques. Near-field microsphere imaging has been demonstrated to be one of these high potential label-free super-resolution techniques.

The aim of this doctoral work is to study new parallelized devices where array of micro-lenses will be used for applications in biology and endoscopy. The project will investigate the transmission and reflection configurations. Both the experimental and theoretical aspects will be addressed, with interactions with partners from the biomedical field. The candidate should have knowledge and experience in photonics and imaging. The project will present an opportunity to develop high potential skills in bio-imaging, optical design and electromagnetic modeling.

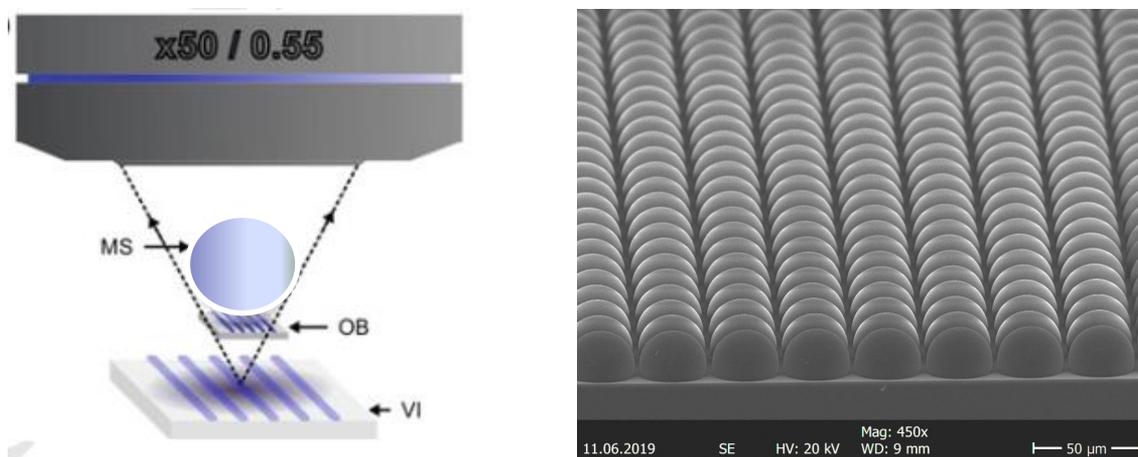


Fig. From one microsphere imaging to an array of microspheres.

Keywords: Super-resolution, photonic nanojet, endoscopy, cell imaging

Research team and Lab:

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ICube is a Research Institute in Strasbourg that brings together researchers of INSA de Strasbourg, the University of Strasbourg, the CNRS (French National Center for Scientific Research), in the fields of engineering science and computer science, with imaging as the unifying theme.

With more than 600 members, ICube is a major driving force for research in Strasbourg whose main areas of application are biomedical engineering and the sustainable development.

The IPP team groups together research activities in the field of the interaction between light and micro- and nano-structured media, with the aim of extracting information or of modifying the material to give it a specific functionality. The application domains are

measurement, instrumentation and laser processing. We are organized around three topics: laser micro-processes, multimodal nanoscopy and photonic instrumentation for healthcare.

Team website: <http://icube-ipp.unistra.fr/>

Strasbourg city:

At 1h40 from Paris by train, Strasbourg's 2000 year history has taken it from being a prosperous merchant city to its current position as capital of the European people, from a center for humanist thinking to a thriving hub of creators and entrepreneurs.

Europe is being constructed here to deal with the major issues currently facing our society, such as education, industrial modernisation, solidarity, the change in energy sources and eco-responsibility.

Strasbourg, inspired perhaps by the soaring steeple of its cathedral, is a city where culture and business combine to form fertile ground for our future development.

Extract from Strasbourg city website: <http://www.en.strasbourg.eu/en/home-en/>

Références

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