

PhD Student Position in integration of a micromachined endomicroscope for OCT imaging in gastroenterology

The FEMTO-ST Institute (CNRS unit), associated with the *Université de Bourgogne et Franche-Comté*, announces the opening of a PhD position in integration of a miniature endomicroscope based on MOEMS/microoptical technologies for OCT imaging in gastroenterology. This position can start in October 2017.

FEMTO-ST is one of 3 largest research institutes in France in the field of Engineering Sciences, having about 730 employees including more than 150 doctoral students. FEMTO-ST facilities offer the full access to a world-class cleanroom facility (class 10/100). The host team is focusing on MEMS and microoptics. FEMTO-ST received funding from the French government by the **LabEx ACTION** which is a cluster of excellence for research on smart systems. Through this program a scanning OCT endomicroscope is developed. A unique and multidisciplinary team of transverse expertise is gathered in LABEX project to design and demonstrate a miniature solution for in vivo 3D OCT imaging to further address the early diagnosis of cancer pathologies that will potentially benefit millions of people worldwide. The final goal of this research position is to contribute to the development of a new generation of miniature optical instruments based on advanced MOEMS and micro-robotics technologies. The challenge is to provide handheld, low-cost endomicroscopes, adapted for early in-vivo diagnosis of cancer and performing automated tasks, such as stabilization of the endoscope tip during manual therapeutic actions or semi-automatic tumour resection.

Description of PhD position

The early diagnosis of stomach cancer is essential since it can be treated more effectively when detected earlier. New diagnostics aids are emerging including the recent techniques of optical coherence tomography (OCT) which permits non-invasive 3D optical biopsies, improving patient's quality of life. The goal of this research position is to provide a handheld and low-cost, endomicroscope, based on MOEMS technologies. The main component of the endomicroscope is the MOEMS probe, which contains a miniature pigtailed Mirau interferometer including an electrothermal MEMS micro-scanner, allowing the 2D scanning of stomach tissues. The Mirau micro interferometer is fabricated by wafer-level vertical stacking and bonding of silicon-glass components: a silicon base, a glass lens, a reference mirror, a separator and a beam splitter. The architecture of Mirau interferometer is now available. In order to scan the stomach lesions the Mirau interferometer is completed by an original 2-axis MEMS scanner based on electrothermal actuation and including a torsional beam.

The PhD workplan will include the assembly of MOEMS and MEMS components to build a complete endomicroscopy microsystem mounted on a robotic arm. In particular, the work will include the integration of MEMS scanner within the OCT endomicroscope. The candidate will perform both optical and micromechanical characterisation of the resulting OCT microsystem including the implementation of image processing procedures, the optimization of actuators control as well as the experimental validation during a session of clinical trials at the local University Hospital. The candidate is expected to write a PhD within the 3-years period.

Qualifications & Employment

The applicant must hold, or to be about to receive before starting the contract, a master degree in physics, photonics, micro/opto-electronics, microtechnology or related areas. The applicant should be strongly motivated to carry out research within the area of Biophotonic Microsystems. The candidate should have background in optics and the background in OCT technologies as well as an experience in cleanroom experience will be appreciated. Proficiency in English is required. The evaluation will be based on the fulfilments of the applicant with the above qualifications.

Full time employment, expected duration of 3 years following the recommendations for French PhD program

Start date: October 1st, 2017

Salary in France: follows national student gross salary agreement: 1700 €/month.

To apply

To apply, please submit a cover letter (detailing relevant experience and career objectives), full curriculum vitae, list of representative publications and letters of recommendation or contact information for two reference persons.

Please apply via email to: Prof. Christophe Gorecki
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We also accept applications via mailing to:

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