

PhD Student Position in microfabrication of microoptical components by 3D printing of glass

The FEMTO-ST Institute (CNRS unit), associated with the *Université de Bourgogne et Franche-Comté*, announces the opening of a PhD Student position in 3D printing of glass components for microoptics and MOEMS (micro-opto-mechanical systems). This position is starting from October 1, 2018. FEMTO-ST in Besançon is one of three largest research institutes in France in the field of Engineering Sciences. FEMTO-ST has about 720 employees including more than 150 doctoral students. FEMTO-ST facilities offer the full access to a world-class cleanroom facility (class 10/100) with the technology platform MIMENTO. The host group MOEMS, is focusing on MEMS technologies and microoptics,

Description of research program

3D printing technologies are Today a source of innovation, opening new fields of applications with opportunity of machining and 3D sculpting of various hard transparent materials (ceramic, glass, fused silica, etc.). One of areas of excellence of MOEMS group, welcoming and carrying the PhD position, is the 3D integration of MOEMS systems with the micro structuration of glass microoptical components. In November 2017, we received a 3D printing system for glass microdevices, installed at the Technology Center MIMENTO. The principle of 3D printing machine combines the femto second laser insolation with wet etching of transparent material. The focused laser beam generates an effect of non-linear multi-photon absorption, modifying locally the refractive index of the material and changing its selectivity to etching. When the exposed part of the substrate is immersed in a chemical etch solution, a 3D shape is generated. 3D printing permits the rapid prototyping of microfluidics, microoptics and micromechanical components.

The PhD candidate will join the MOEMS group and will strongly collaborated with the staff of MIMENTO. The duration of PhD research program is of 3 years. The program work will focus for 2 years on the deep understanding of the physical mechanisms involved in the process of glass printing (femtosecond laser machining and wet etch of glass) as well as the development of microstructuration procedures for glass components in "Borofloat33". The candidate will study the boundary conditions of the micro-structuring process for glass material. To match the specifications of optical quality for microoptical components, polishing strategies will be studied to reduce surface roughness (local thermal polishing: CO2 laser, defocused laser beam, etc.). In the second part of the thesis (1 year), the know-how acquired on glass printing will be the basis for the implementation of relevant "project demonstrators ". Two examples are the realization of microlens matrix with controlled asphericity, reflective objectives and the fabrication of miniature beam splitter for interferometry.

Description of the position

The main objective of the position will be to take part in the development of 3D printing procedures of glass and implementation of demonstrators for microoptics. The candidate is expected to write a PhD within the 3-years period.

Qualifications

The applicant must hold, or to be about to receive before starting the contract, a MSc degree in physics, electrical engineering, micro/opto-electronics, materials science, microtechnology or related areas. The applicant should be strongly motivated to carry out research within the area of Photonic Microsystems. Background in photonics as well as in laser machining will be appreciated. The candidate should have a cleanroom experience (e.g. photolithography, DRIE + other etching processes, wafer bonding, film deposition, characterization techniques). Proficiency in English is required for communication within the consortium and to publish results and present them at international conferences (fluency in French can be considered as an asset but is not mandatory). The evaluation will be based on the fulfillments of the applicant with the above qualifications.

Employment

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

Start date: October 1st, 2018

Salary: follows national student salary agreement: 1830 €/month

Application

The application must include:

1. Full curriculum vitae including all your relevant academic, professional, and other achievements, experience and knowledge.

2. Copy of the degree certificate(s) and transcripts of records from your previously attended university-level institutions, with certified translations in English (unless provided so by the issuing institution)
3. Statement of purpose: Why the applicant wants to pursue a PhD, what are your academic interests, how they are related to your previous studies and future goals; maximum 2 pages long.
4. List of representative publications or technical reports (if applicable).
5. Letters of recommendation or contact information for two reference persons

Deadline for application is September 1st, 2018.

Please apply via email to:

Prof. Christophe Gorecki
christophe.gorecki@femto-st.fr

We also accept applications via mailing to:

C. Gorecki
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