Research Fellow Position in Materials and Quantum Beam Science: (i) Thermo-Mechanical Processing and (ii)Time Response to Materials Stimulus (RF-2018002)

Position
Research Fellow (Postdoctorate)

Program
Materials Sciences and Engineering

Research Area
Thermo-Mechanical Processing, Time Response to Materials Stimulus

Contacts
Prof Klaus-Dieter Liss

Phone: +86-0754-88077102

Email:
Klaus-Dieter.Liss@gtiit.edu.cn

Application Deadline
open until filled

Date Posted
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Description

We have up to two Research Fellow positions (post-doctoral level) available in the project areas (i) Modern Diffraction Methods for the Investigation of Thermo-Mechanical Processes (ThermoMech.Pro) and (ii) Time Response to Materials Stimulus. The Material Science and Engineering Program, within the Center for Materials and Quantum Beam Science and the group of Prof Klaus-Dieter Liss, is looking for enthusiastic, motivated and competent scientists to conduct experimental research projects in the advance of understanding (i) metallic and related materials upon thermal, mechanical and thermo-mechanical processing and (ii) time-resolved structural response of materials to external stimulation, investigated by modern techniques of synchrotron and neutron radiation, and complementary studies. Candidates will pursue their own research within the field and also work in a team of students and researchers. Contract duration: 3 years.

Note: Priority of the filling of the positions is project (i) first, and second (i) or (ii) subject to the quality of the candidates, with preference to (ii) if (i) has been filled.

Project Details

Quantum beam sources, comprising synchrotron and neutron radiation have tremendously evolved in their capabilities to study materials in a wide sense under in-situ conditions and time-resolved. Research within the Liss Group of the Center for Materials and Quantum Beam Science focuses along the two lines (i) the investigation of thermo mechanical response, mainly on metals, and (ii) fast time-resolved processes studied by diffraction and spectroscopic methods. Excellence in the characterization and analysis method shall be applied to advance findings at the forefront of research in materials. The two program lines are not exclusive.

(i) Thermo-Mechanical Processing: Quantum beams will be applied to the understanding of the thermal and deformation behavior of metals and related materials, especially under in-situ conditions. In particular, the concept of the Materials Oscilloscope shall be used and further developed, complemented by other quantum beam methods. The applications range from the fundamental understanding of physics of he material's structural evolution to applications in materials and processing design. Items of fundamental interest are the occurrence, kinetics, correlations and mechanism of structural transformations such as phase transformations, deformation systems, grain growth and refinement, recrystallization, recovery, all static and dynamic. Applications settle in the design and life span of intermetallics, steels, light metals in ideal form and composites.

(ii) Time Response to Materials Stimulus: Temporal response shall be investigated when a material is excited by external stimulus, such as high-frequency oscillations, switching electro-magnetic fields, thermal shock or other pump-probe technique.

Scientific leading output on the materials is envisaged encompassing emerging and novel time-resolved techniques. Complementarity of different quantum beams and methods shall be exploited in order to achieve comprehensive scientific results. From a literature review and technical feasibility in-house and at large-user facilities (synchrotrons, neutron sources), the candidate selects adequate materials research problems and experimental setups. Complementary time averaged quantum beam scattering studies enhance the capabilities necessary for the materials characterization and in-depth evaluation of diffraction data. Time responses can lie in the sub-millisecond to sub-nanosecond domain. There exists a wide span of materials problems, such as high-cycle fatigue in ultrasonic fields, multi-ferroic relaxation, ultrafast temperature changes, electro-magnetic switching, laser pulse impact etc. Materials can be both structural and functional materials.

Considerable overlap and synergies between the two project directions exist and it is sought that the groups work as a team in theoretical approach, conduction of experiments and data analysis. A few sub projects are being established to which the candidate may contribute.

Keywords

(i) metallurgy; plastic deformation; slip; twinning; martensitic transformation; phase transformation; recovery; recrystallization; dislocations; crystal perfection; light metals; steels; intermetallics;

(ii) ultra-short time resolved; relaxation; response; ultrasonics; phonons; structural materials; functional materials;extreme conditions;

Generic: advanced diffraction techniques; in-situ studies; real-time studies; advanced data analysis; computing and automation; scattering theories; diffraction theories; neutron scattering; synchrotron radiation; free-electron laser.

Selection Criteria

- PhD degree (or equivalent) in Physics or Material Science (essential)

- Strong background in condensed matter physics (preferable)

- Vast experience in using synchrotron radiation and unconventional data analysis (essential)

- Expertise in multi-dimensional high-energy X-ray diffraction (highly preferable, project (i))

- Expertise in sub-millisecond to picosecond X-ray diffraction (highly preferable, project (ii))

- Expertise in laboratory X-ray diffraction (essential), reciprocal space mapping (preferable)

- Strong interest in complementary techniques, especially neutron diffraction (essential)

- Strong computing skills, including programming, scripting (essential) linux

(preferable)

– Strong interest to work temporarily at large-scale research facilities in China, Europe, United States, Japan or Australia (essential)

– Familiarity with and rigorous diffraction data presentation in reciprocal space (essential)

– Strong interest in exact work and artistic presentation (essential)

– Good command of English (essential)

– Ability to work both independently and in a team environment (essential)

– Ability to author scientific reports and co-author scientific publications (essential)

– Willingness to participate in other research projects (essential)

– Ability to author scientific reports and scientific publications (essential)

Benefits

– Salary range: up to $49,000 / year (depending on qualifications of the candidate)

– Subsidized housing at GTIIT, China

– Health insurance: regular cover for Chinese citizens or private health insurance for foreigners

– Professional conference travel allowance

Application

– Application deadline: **open until filled**

– Send below required documents electronically to: Klaus-Dieter.Liss@gtiit.edu.cn

1. Curriculum vitae and personal statements
2. A publication list
3. Three letters of recommendation (one from the mentor for PhD and/or Master's studies)
4. A short research plan outline (up to one page in length)
5. Degree certificates with certified English translation for both the PhD and Master's degrees