Leibniz-Institut für Kristallzüchtung

The Leibniz-Institute for Crystal Growth (IKZ) is a leading research institution in the area of science & technology as well as service & transfer of crystalline materials. Our goal is to enable solutions for urgent societal challenges (e.g. communication, artificial intelligence, climate protection, health etc.) by modern electronic & photonic technologies. The work covers the full spectrum from basic over applied research up to pre-industrial development and is performed in collaboration with national and international partners from university, academy and industry. The institute is part of Forschungsverbund Berlin www.fv-berlin.de and a member of the *Leibniz Association* www.leibniz-gemeinschaft.de. You can find more details on the institute webpage: www.ikz-berlin.de.

Commencing as soon as possible there is an opening for a

PhD position (m/f/d)

for the topic:

Direct Measurement of the Electrocaloric Efficiency in Ferroelectric Materials

The electrocaloric effect is based on an entropy change in a ferroelectric material induced by application of external electric fields. Similar to a normal kitchen fridge, where the entropy change in an exchange gas after compression or decompression is used to cool the inside of the fridge, one can exploit the entropy change during (de-)polarization of a ferroelectric thin film for solid-state cooling devices. It is believed that integrating such “cooling” layers in electronic devices could significantly increase their energy efficiency. The highest efficiency of the electrocaloric effect is expected in the realm of structural phase transitions where the polarizability is the highest. However, a direct characterization of the cooling power is hindered by several obstacles. In this project, we tackle this problem by employing a new measurement technique, the so-called time-resolved x-ray diffraction (TR-XRD) method. TR-XRD takes snapshots of a crystalline structure after impulsive excitation, e.g. with ultrashort laser pulses. The experiments are mostly performed at synchrotrons (e.g., Petra III, ESRF), however, all-optical calibration measurements using ultrashort lasers are an important part of the project. The activities are embedded in a close collaboration with the Institut für Werkstoffwissenschaften (IFW) in Dresden.

The tasks of this experimental thesis involve preparing and performing time-resolved experiments using ultrafast lasers and synchrotron- or lab-based x-ray sources. Data analysis and minor simulation tasks complement the work program. The laboratories are located in the IKZ-DESY JointLab in Hamburg-Bahrenfeld.

Qualifications:

- MSc degree in physics, materials science, Nanoscience or in a related discipline

Prior experience in the following fields is an asset to your application:

- Lasers and X-rays, especially experience with time-resolved and/or synchrotron-based experiments
- Programming skills (Python, Matlab, C)
- A strong background in solid-state physics
- Good English language skills written and oral

The position is limited to three years. Payment is according to 75 % TVöD Bund, treaty for German public service. IKZ is an equal opportunity employer. Therefore, female candidates are encouraged to apply and will be preferred in case of adequate qualification. Among equally qualified applicants, preference will be given to disabled candidates.

For information about the project contact Dr. Peter Gaal, peter.gaal@ikz-berlin.de, phone +49 30 6392 2858.

Have we aroused your interest?

Then apply with a letter of motivation for this project (1 - 2 pages), curriculum vitae and all relevant certificates by **12.02.2021**. To do so, please go to **Job offers/jobs** on our homepage and click on this advertisement and then on **"Apply online"**. Please send us your complete application documents this way.

We look forward to receiving your application!