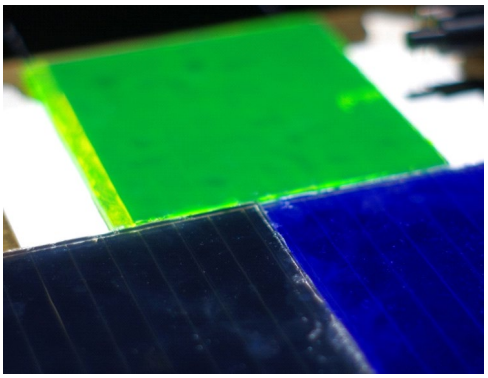
Karlsruher Institut für Technologie

Postdoctoral Position in
Optical Engineering:

# Luminescent Materials for Solar Energy Harvesting: Experiment & Simulation



The use of luminescent materials to enable us to actively tune the wavelengths of light has many implications on today's society. For example: i) colour conversion layers are now commonplace in LEDs; ii) adding fluorescent taggants to plastic products can greatly enhance the purity of the recycled product (takes us closer towards a circular economy); iii) altering the solar spectrum before it strikes a photovoltaic (PV) cell has the potential to increase its conversion efficiency, especially via down-conversion (or quantum cutting); iv) while luminescent solar concentrators (LSCs) can play a role in both building-integrated PV as well as in enhancing plant growth in greenhouses.

Prof. Richards' and his research group have been active in the area of luminescent materials for solar energy harvesting for nearly 20 years. We are seeking to attract a new postdoctoral researcher to join our team who can help lead our research in the area of luminescent materials for solar energy harvesting. We are looking for a person who:

- Is willing to lead and take others along with them!
- Is able to manage their own research independently, but can interface well with others in the team (e.g. chemists and materials scientists who are engineering the luminescent materials)
- Is interested in building up scientific collaborations and an international network.

The successful candidate will have a strong background in optics and/or optical engineering, ideally spanning the following areas:

- A solid understanding of luminescent materials and their key parameters, incl. how to select the best material for each application (we synthesise a wide range of oxide, fluoride, oxysulphide, and sulphide based materials in house for a wide range of emission wavelengths (visible, NIR)
- Extensive optical characterisation of luminescent materials: steady-state photoluminescence (PL), time-resolved PL (timeframes of μs to seconds), and PL quantum yield measurements.
- Insights into structure-property relationships for optimising material performance, e.g. for example, lifetime in the case of persistent luminescent materials.
- Engineering of the above luminescent materials into designs based around upconversion (UC), luminescent down-shifting (LDS) or LSCs
- Simulation of LDS and LSC technologies using in-house ray-tracing software and other packages.
- Preparation of polymeric samples doped with luminescent materials – e.g. via spin-coating, doctor-blading, ink-jet printing – to realise LDS and LSC samples.
- Optical and electrical characterisation of LDS and LSCs
- Extend upon existing outdoor testing facilities in order to monitor long-term stability of LDS and LSC devices.
- The devices could be scaled up to as large as 30cm x 30cm.

Throughout the project, there will be multiple opportunities for cooperation with internal and external partners, both academic and industrial, as well as providing the day-to-day supervision of Masters and PhD students, as well as sharing your knowledge via teaching.

**Qualifications and Experience**: that are required are: i) you hold a PhD in optics, photonics, optical and/or electrical engineering. You are a naturally curious person who is eager to learn more and is a demonstrated problem solver. You must have a strong research track-record. You will have experience in supervising more junior team members, such as PhD and MSc students, and a demonstrated ability to be able to thrive in a multidisciplinary research environment. For within the group, excellent English language proficiency is essential (both written and spoken). You will be competent in representing KIT at project meetings and also when presenting results at international conferences.

**KIT:** KIT is one of the biggest research institutions worldwide and has access to state-of-the art research facilities resulting from the merger of the National Research Centre of the Helmholtz Association and the former Technical University of Karlsruhe. This project is based in the Nanophotonics for Energy group within the Institute of Microstructure Technology (IMT) and the Light Technology Institute (LTI).

**Position:** The present position is for a period of 3 years.

**Contact:** Prof. Dr. Bryce S. Richards, Institute of Microstructure Technology (IMT) and Light Technology Institute (LTI), Email: bryce.richards@kit.edu

**Applications:** For the application please provide the following documents in electronic form: i) Cover letter detailing your motivation for the position; ii) CV; iii) List of publications; iv) Transcript of records / MSc degree; v) PhD certificate; vi) Contact details of 3 referees.