PhD position in the field of hydrothermal synthesis

Universität Konstanz

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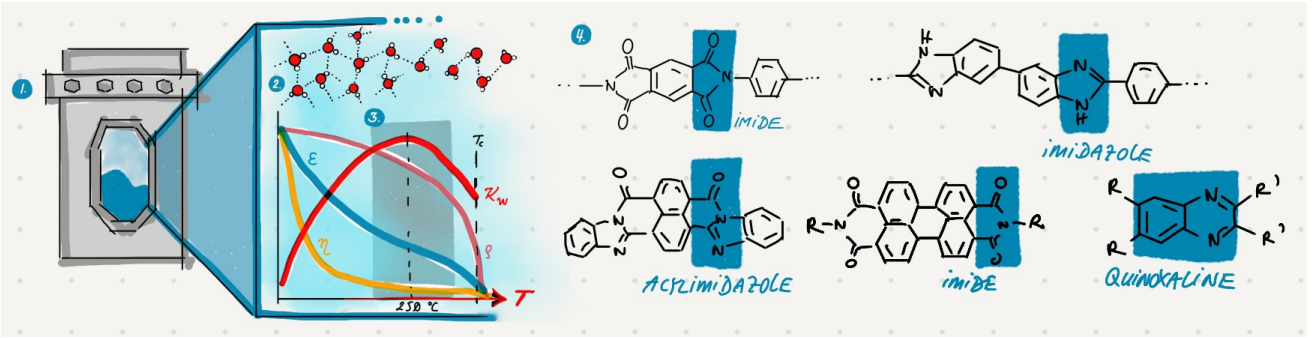
What we offer: One PhD position in the field of hydrothermal synthesis, in an interdisciplinary and vibrant research group at the wonderful University of Konstanz. We provide cutting-edge scientific training including chemical synthesis, handling of reactors, advanced characterization techniques, and presentation and discussion of data. We furthermore provide ample soft skills training and support all team members in reaching their full potential.

Basic data: The **deadline of application is July 7th, 2024**. The **intended starting date is August 2024**. The project will be situated at our laboratories at the University of Konstanz in Konstanz, Germany. We have a second branch at the CeMM - Research Center for Molecular Medicine of the Austrian Academy of Sciences. Short stays in Vienna are part of this project.

What we are looking for: Candidates are required to hold a Masters/Diploma/Magister university degree in chemistry, chemical engineering, process engineering, chemistry, or a related discipline. Experience in working with reactors and/or reactor design and/or reactor optimization and/ design of experiments and/or programming is desired, but not strictly necessary. Skills in organic chemistry (ideally of aromatics and heterocyclics) and related characterization techniques (solution and solid-state NMR, MS, UV-Vis, HPLC, etc.) are required. Experience in materials synthesis and solid-state characterization is required. Full working proficiency in English as well as the ability to work in an interdisciplinary, intercultural, and diverse team is a must.

How to apply: Applications have to be submitted in English via email to: office.unterlass@uni-konstanz.de. Please submit a single pdf, named **"surname_givenname.pdf".** Applications may be submitted **from June 30th, 2024 until the deadline of application.** The submitted application pdf must include: (i) Motivation letter, (ii) Curriculum vitae including a list of publications, conference contributions, and other scientific activities, (iii) Transcript of records of the Bachelor, Master, (iv) Title and a short summary of the diploma/master and PhD theses, (v) contact details of two referees.

The project: Hydrothermal synthesis (HTS) relies on using high-temperature liquid water as reaction medium. HTS mimics the natural formation of various minerals that form by condensation reactions under hydrothermal conditions (e.g., zeolites, metal oxides, silicates) and as been explored since decades in inorganic chemistry.[1] Recently HTS has been shown to also be amenable to the synthesis of organic compounds. Our group provided several examples including e.g., aromatic polyimides, rylene dyes, perinone, polybenzimidazoles, and quinoxalines (4).[2-6] HTS is conventionally performed in batch for instance in autoclaves (1) or microwave vials, in which H_2O and the starting compounds are heated to increased temperatures (typically to 180-250 °C). Wit increasing T, H_2O's hydrogen-bonding breaks down successively (2), which results in H_2O's physicochemical properties changing for the better with respect to being a suitable medium for organic synthesis. For instance (3), polarity (ε), viscosity (η), and density (ϱ) decrease, while H_2O's autoprotolysis (K_w) increases (maximum at 250 °C). We believe that HTS bears the potential to be suitable for synthesizing many more organic scaffolds. To explore this potential efficiently and bringing HTS to the next level, we aim at broadening the realm towards (i) yet by HTS non-explored heteroaromatic-containing compounds, and (ii) mixed solvent systems, i.e., towards hydrothermal-solvothermal synthesis.



Related publications: [1] M. M. Unterlass, *Biomimetics* **2017**, *2(2)*, 8-27. [2] B. Baumgartner, M. J. Bojdys, & M. M. Unterlass, *Polym. Chem.* **2014**, *5*, 3771-3776. [3] B. Baumgartner, A. Svirkova, J. Bintinger, C. Hametner, M. Marchetti-Deschmann, & M. M. Unterlass, *Chem. Commun.* **2017**, *53*, 1229-1232. [4] M. J. Taublaender, F. Glöcklhofer, M. Marchetti-Deschmann, & M. M. Unterlass, *Angew. Chem. Int. Ed.* **2018**, *57*, 12270-12274. [5] M. J. Taublaender, S. Mezzavilla, S. Thiele, F. Glöcklhofer, & M. M. Unterlass, *Angew. Chem. Int. Ed.* **2020**, *59*, 15050-15060. [6] F. A. Amaya-García, M. Caldera, A. Koren, S. Kubicek, J. Menche, & M. M. Unterlass, *ChemSusChem* **2021**, *14*, 1-12.