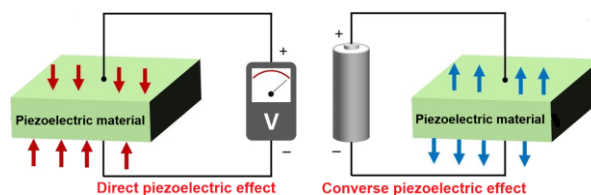


Master's Thesis project – open call (Advanced Materials Science, Technical Chemistry)

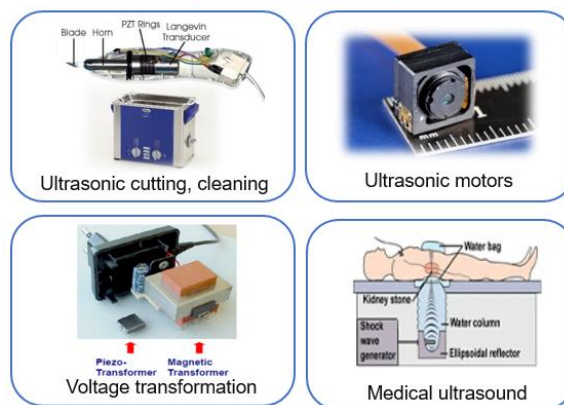
Analysis of loss anisotropy in lead-free piezoceramics

Scientific background

Piezoelectrics are functional materials that enable the interconversion of mechanical and electrical signals and are therefore used in a wide range of modern applications such as sensors, transducers, actuators, power generators, energy harvesters, etc. [1,2]. One of the major challenges is heat generation caused by losses, which strongly depends on the direction of piezoelectric vibration [3]. This project will focus on investigating the origins of these losses, which are related to material's chemical composition and crystal structure. The objective is to identify the loss mechanisms and thus enable the preparation of improved materials for future applications.



High-power piezoelectric applications



What we offer

The first goal will be to prepare oxide piezoceramic samples of various dimensions suitable for exciting different piezoelectric vibration modes in order to study vibration anisotropy of loss mechanisms. Within this thesis, you will get familiar with experimental techniques used for the synthesis and characterization of piezoelectric ceramics. In addition, you will gain knowledge on electroceramic materials and develop skills in microscopy, X-ray diffraction, and electrical measurements of piezoceramics. We offer a financial support of 440 €/month for the time of the thesis, which is planned for 6 months.

Requirements: Ongoing studying programme Advanced Materials Science, Technical Chemistry, or Physics; self-organized and independent way of work, good English skills.

Contact

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References

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- [2] X. Gao *et al.*, *Piezoelectric Actuators and Motors: Materials, Designs, and Applications*, *Adv. Mater. Technol.* **5**, 1900716 (2020).
- [3] M. Hagiwara *et al.*, *Identicalness between Piezoelectric Loss and Dielectric Loss in Converse Effect of Piezoelectric Ceramic Resonators*, *Jpn. J. Appl. Phys.* **51**, 09LD10 (2012).

Images: Kamel, *Biophys Rev* 717 (2022), *Elma Schmidbauer GmbH*, *Laser focus world*, *TDK corporation*, *CeramTec* and *Mouser electronics*