| Modulbezeichnung: | **Introduction to lead-free perovskite ferroelectrics for electro-mechanical systems (GRK2495-Lecture)** (Introduction to lead-free perovskite ferroelectrics for electro-mechanical systems) | **5 ECTS** |
|---|---|---|
| Modulverantwortliche/r: | Kyle G. Webber, u. Mitarbeiter | |
| Lehrende: | Dozenten, Kyle G. Webber | |

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| Startsemester: WS 2020/2021 | Dauer: 1 Semester | Turnus: unregelmäßig |
| Präsenzzeit: 90 Std. | Eigenstudium: 60 Std. | Sprache: Englisch |

**Lehrveranstaltungen:**

Mechanical Properties of Ferroelectrics (WS 2020/2021, Vorlesung, 3 SWS, Kyle G. Webber)
Piezoelectric Properties of Lead-Free Ferroelectrics (WS 2020/2021, Vorlesung, 3 SWS, Ken-ichiro Kakimoto)

**Empfohlene Voraussetzungen:**

Participants should be familiar with the dielectric, piezoelectric, and ferroelectric properties of normal ferroelectrics and have an understanding of the crystallographic origins of the electromechanical properties.

**Inhalt:**

The FAU-NITech lecture series where Professors co-teach a module of two interdisciplinary graduate level lectures is organized by the International Doctoral Program GRK2495 Energy Conversion Systems. This module (5ECTS) consists of: Mechanical Properties of Ferroelectrics from Prof. Webber Piezoelectric Properties of Lead-Free Ferroelectrics from Prof. Kakimoto

**Lernziele und Kompetenzen:**

Introduction to dielectric, piezoelectric, and ferroelectric properties of ferroelectrics: background on dielectric and piezoelectric properties with a focus on the influence of material phenomena at multiple length scales, such as domain wall and phase boundary motion, as well as the influence of external thermal, mechanical, and electric fields; Various measurement techniques, such as Rayleigh behavior and impedance spectroscopy; the large field response of ferroelectrics, namely ferroelectricity and ferroelasticity with a particular focus on the effect of crystal structure and compositional phase boundaries, the role of domain wall motion and defects, and the influence of stress-induced structural phase transformations; Measurement techniques for characterizing large field behavior, such as the Sawyer-Tower circuit.

Basic and latest information on the functional properties of ferroelectric materials, for which the orientation of spontaneous polarization changes with electric field; important ferroelectric families such as piezoelectrics which are polarized by stress, and pyroelectrics which hold spontaneous polarization without an external signal. The purpose and goal of this course is to understand the characteristics of those materials and the ways of new material design.

**Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:**

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

[1] **Energietechnik (Master of Science)**

(Po-Vers. 2018w | TechFak | Energietechnik (Master of Science) | Gesamtkonto | Wahlmodul (FAU-weit))

Dieses Modul ist daneben auch in den Studienfächern "Elektrotechnik, Elektronik und Informationstechnik (Master of Science)", "Maschinenbau (Master of Science)", "Mechatronik (Master of Science)", "Wirtschaftsingenieurwesen (Master of Science)" verwendbar.

**Organisatorisches:**

Both lecture contents of this module are provided on studon https://www.studon.fau.de/cat3069729.html (Angebote-Forschungseinrichtungen-Graduiertenkolleg 2495: Energiekonvertierungssysteme-Block Lectures)

Anmeldung über meincampus, studon oder julia.b.berger@fau.de

Geeignet für Masterstudierende aus: EEI, ET, MWT, NT, MAP, CE, MB, ME, WING