

Lead free ultrasonic transducers

Author to be announced

DTU Nanotech

Ultrasonic transducers are used in many different applications. In the field of medical imaging, ultrasonic transducers are a key component of the ultrasonic imaging scanners. These transducers are today made using the piezoelectric material PZT which contains lead. However, for environmental reasons, the use of lead is a problem when the transducers are disposed.

A lead free alternative is therefore attractive and one way to produce lead free transducers is to use micro machined ultrasonic transducers made in silicon, the second most abundant element on the earth.

This project will explore the fabrication such devices. In these transducers silicon dioxide is a key material and the properties of the devices depends critically on the electrical properties of this material.

Silicon dioxide is widely used in many different electronic components due to its excellent electrical properties. However, when making silicon dioxide the quality of the oxide depends on the processing conditions.

In this project we will investigate the electrical properties of the oxides that can be made in the DANCHIP cleanroom.

We use these oxides as a central part of capacitive micro machined ultrasonic transducers and the oxide has to be able to withstand high voltages. Often, the devices work with an applied bias of 200 Volts.

In this project we will

- * Grow oxides in the furnaces at DTU Danchip
- * Make MOS capacitors
- * Perform electrical characterization
- * Determine the oxide quality

To perform the characterisation we will use a brand new state-of-the-art measurement system that we have just received. This system can measure very small currents and as part of the project we will build the needed measurement setups.

This characterisation is an important step in the development of the lead free ultrasonic transducers.