Master or diploma thesis

Modeling the temperature behavior of magnetic electrical, resonant microsensors

The detection of lowest magnetic field changes at room temperature is possible by a new type of sensor concept, in which piezoelectric and magnetostrictive thin layers are combined to a magneto-electric, resonant microstructure (Figure 1).

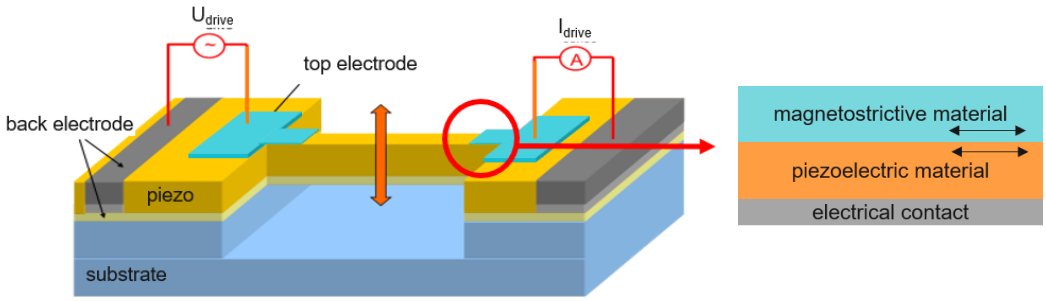

Figure 1: Structure and functional layers of a resonant magnetoelectric sensor structure

The basic function is based on measuring a resonance frequency shift depending on the magnetic field (Figure 2). The sensor properties are subject to temperature-dependent fluctuations, which means that the influence of magnetic field and temperature changes on the output signal cannot be separated clearly.

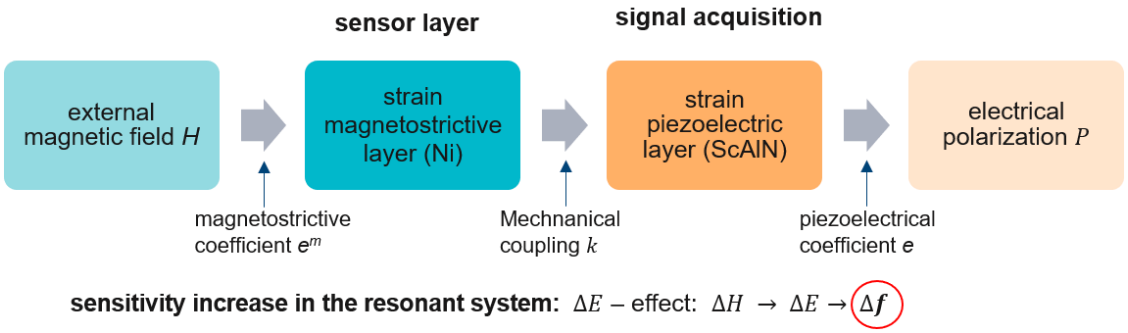

Figure 2: Functional principle and material-dependent coupling factors of the ME sensor

Your task aims at the extension of an existing COMSOL model of the basic structure with regard to thermal dependencies in the range between -52 to 125 °C. The stucture in focus is a bridge-shaped design based on the material combinations TiN/ScAlN/Ni and Pt/ScAlN/Ni. The first design rules and an optimization approach as well as concepts for possible temperature compensation schemes shall to be derived based on the model.

The work is affiliated to the **XMEN** research project and takes place in close cooperation with the company **Endress+Hauser AG**. You are invited to take part at the voluntary research group "**Group III-Nitrides**" of the internal graduation college of the Institute for Micro and Nanotechnologies, which aims at a free scientific cooperation.

Language: English or German

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