

Kolloquium der Abteilung 8
Medizinphysik und metrologische Informationstechnik

Donnerstag, 22. Februar 2018, 11.00 Uhr

Prof. Dr. Eckhard Quandt

Inorganic Functional Materials, Institute for Materials Science

Faculty of Engineering, University of Kiel, Germany

“Magnetolectric Magnetic Field Sensors”

Magnetolectric (ME) composite materials show ME coefficients that are larger than that of natural multiferroics by several orders of magnitude. These ME composites have high potential for applications, e.g. as very sensitive ac magnetic field sensors. Special features are their passive nature, their high sensitivity, and their large dynamic range with linear response. By a suitable combination of magnetic shape anisotropy and field annealing it is possible to obtain a sensor element that has a pronounced sensitivity in only one dimension being a component of a 3-dimensional vector field sensor, which is highly desirable for applications like magnetoencephalography (MEG) or –cardiography (MCG).

The thin film ME components are AlN or ferroelectric piezoelectrics (e.g. PZT) and different magnetostrictive single and multilayers. Upon magnetic field annealing these ME composites show an uniaxial magnetic anisotropy and an extremely high ME coefficient of approximately to 5 kV/cmOe at mechanical resonance and a limit of detection below 500 fT/Hz^{1/2}.

In this presentation different thin film composites will be discussed in terms of their use as very sensitive magnetic field sensors in the pT range at biomagnetic relevant frequencies (1-100 Hz). To obtain sufficient limit of detections (LODs) in the required low frequency range magnetic and electric modulation techniques are investigated. As an alternative to modulated sensors, sensors based on the ΔE -effect using either ME cantilever-type sensors or surface acoustic wave (SAW) sensors will be presented.

Ort:

Physikalisch-Technische Bundesanstalt - Institut Berlin
Hörsaal, HvH-Bau
Abbestraße 2-12, 10587 Berlin

Zu diesem Kolloquium sind alle Interessenten herzlich eingeladen!

Verteiler:

P, VP, MP, PSt, AL 3, AL 6, AL 7, Z.15, PR-IB, Wache, IB.TP (Mit Bitte um Bereitstellung der Technik)