DF 6: Application of dielectric solids

Time: Monday 16:50–17:50 Location: EB 107

DF 6.1 Mon 16:50 EB 107

Dielectric pore-free glass-ceramic materials with good metal adhesion properties for GHz applications — •Hubertus Braun[1,2], Martin Letz[2], and Martun Hovhannisyan[2] — [1]Johannes Gutenberg-Universität Mainz — [2]Schott AG, Mainz

In recent years, the continuous growth in mobile communication technologies operating in the microwave frequency range demands cost-efficient low-loss dielectric materials with sufficiently high relative permittivity. Conventional microwave devices like antennas or filter elements which operate close to lossy materials, such as human tissue, decrease their performance due to additional dielectric losses (*Body Loading* effects). These effects can be prevented by using *Dielectric Loading*. Therefore metallised low-loss high permittivity ceramics ($\varepsilon_r \approx$ 20-80) are needed which allow a high concentration of the EM near-field inside the dielectric and thereby a reduction of external influences. An additional advantage of dielectric loaded devices lies in their smaller size compared to conventional pure metal devices, following the miniaturisation trend of microelectronics of the last decades.

A possible alternative to conventional sinter-ceramic fabrication techniques is glass-ceramic technology in which the desired geometries can be cast to net shape followed by crystallisation to achieve intrinsic pore free materials with the desired dielectric properties and comparatively superior metal adhesion properties. In the current work, promising glass-ceramics in the Rare-Earth-Titanate system are analysed concerning suitability for DLA applications and comparative measurements are made with commercially used sinter-ceramics.

DF 6.2 Mon 17:10 EB 107

Time dependent properties of ferroelectric electron emission from PMN-PT single crystals — •Jana Becherer, Oliver Mieth, and Lukas M. Eng — Institut für Angewandte Photophysik, Technische Universität Dresden, D-01062 Dresden

We report on the electron emission properties of PMN-PT single crystals upon cyclic switching using a variety of different voltage shapes. An aperture in the top electrode allows electrons to exit from the ferroelectric solid into vacuum. The emission current was measured under UHV conditions using a single electron detector. We find that the emitted electron current strongly depends on both the duty cycle and repetition rate of the applied voltages. Comparative measurements of the polarization switching in the samples were performed. The polarization switching occurs over a broad distribution of time as is typical for relaxor PMN-PT. We found that the electron emission is strongly correlated with the amount of reversed polarization.

DF 6.3 Mon 17:30 EB 107

Voltage tunable polymer laser device — •Matthias Kollosche[1], Sebastian Döring[2], Joachim Stumpe[2], and Guggi Kofod[1] — [1]ACMP, Institut für Physik und Astronomie, Universität Potsdam, Karl-Liebknecht-Str. 24-25, 14476 Potsdam, Germany — [2]Fraunhofer Institute for Applied Polymer Research, PPC, Geiselbergstr. 69, Potsdam-Golm, 14476, Germany

Organic laser materials offer a broad optical gain spectra they are predestined for the realization of tunable laser sources. Here we report on a compact organic laser device that allows for voltage controlled continuous wavelength tuning in the visible range of the spectrum without the usage of an external motion control. The compact optical element consists of an elastomeric distributed feedback (DFB) laser and an electro active elastomer actuator also known as artificial muscle. To enable direct wavelength tuning the elastomer laser is placed in the centre of the prepared actuator. The chosen configuration geometry and electrode distribution of the elastomeric actuator gives rise to homogeneous compression in the centre of the actuator. The voltage induced deformation of the artificial muscle is transferred to the elastomeric laser and results in a decrease of grating period. This leads to an emission wavelength shift of the elastomer laser. The increase of actuation voltage to 3.25 kV decreased the emission wavelength of the laser device from 604 nm to 557 nm, a change of 47 nm or 7.8%.