ST 4: Poster Session Radiation and Medical Physics

Time: Monday 16:30–17:00 Location: H 2033

ST 4.1 Mon 16:30 H 2033

Spatially resolved characterization of heavy ion irradiated LiF using static field gradient NMR — Holger Stork[1], Annika Hamburger[1,2], Kurt Schwartz[3], Franz Fujara[1], and •Achim Gädke[1] — [1]Technische Universität Darmstadt, Germany — [2]Johann-Wolfgang-Goethe Universität, Frankfurt a. M., Germany — [3]Gesellschaft für Schwerionenforschung, Darmstadt, Germany

Nuclear Magnetic Resonance (NMR) has been proven to be a valuable tool for investigating radiation damages in crystals. A relationship between the spin-lattice relaxation rate and the defect density has been derived and experimentally tested [1] and the dynamical properties of the defects have been investigated temperature- and field-dependent [2]. But up to now none of the NMR measurements was spatially resolved. This does not matter for homogeneously irradiated samples, but for heavy ions the defect creation is typically depth-dependent. In this contribution depth-dependent NMR relaxation measurements on heavy ion irradiated crystals are presented for the first time. The perturbation depth of the Xe and U ions we used in the LiF crystals was between 80 and 100 μm. In the irradiated area a clear increase of the relaxation rate could be observed. But we observed also a transition range outside the ion irradiated area where the relaxation rate is raised compared to the unirradiated sample. This effect might be due to secondary radiation. 1. phys.stat.sol. (b) 236, No. 1, 151-165 2.Rad. Eff. & Defects in Sol. Vol 155, 159-163

ST 4.2 Mon 16:30 H 2033

Determination of liver function capacity by time-resolved breath tests — •Rubin Tom[1], Augustin Sven[1], Heyne Karsten[1], and Stockmann Martin[2] — [1]Freie Universität Berlin, Fachbereich Physik, Arnimallee 14, 14195 Berlin — [2]Charité Berlin, Klinik für Allgemein-, Viszeral- und Transplantationschirurgie, Augustenburger Platz 1, 13353 Berlin

In hepatology, a noninvasive and direct method for assessment of the liver function is not available. Breath tests in combination with isotopically labelled compounds are often used to determine the liver function, by measuring the 13CO2/12CO2 ratios in exhaled air on a time scale of tens of minutes. Before exhalation the 13CO2 generated in the liver, is dissolved as 13C bicarbonate in the blood. Decay kinetics of the 13C bicarbonate does therefore not typically reflect its instant generation, especially for longer times. This makes it difficult to derive meaninful information on the functioning of the liver from the 13CO2 kinetics. Here, we report a new experimental approach for measuring the 13CO2 content in exhalated air within seconds, by infrared spectroscopy, which allows monitoring the liver capacity in real-time.

ST 4.3 Mon 16:30 H 2033

Atmospheric plasma jet for medical application — Antje Lehmann[1], Ulrich Dussa[2], Thomas Arnold[1], •Georg Boehm[1], Axel Schindler[1], and Stefan Rupf[2] — [1]Institut für Oberflächenmodifizierung e.V., Permoserstrasse 15, 04318 Leipzig, Germany — [2]Universitätsklinikum des Saarlandes, Klinik für Zahnerhaltung, Parodontologie und Präventive Zahnheilkunde, 66421 Homburg/Saar

During the last decade non-thermal plasma jets have been emerged as a versatile technology for surface processing like local etching, deposition, surface cleaning and surface activation. We have developed atmospheric plasma jets on the basis of 2,45 GHz microwave discharges for medical and for dentistry applications. The present investigation is aimed to operate the jet to deactivate bacteria. A mixture of He, N_2 and O_2 (1000 sccm : 500 sccm : 4 sccm) was used for driving the jet and to produce oxygen radicals and/or ozone. The average microwave power of 1.6 W has been adjusted to avoid jet temperatures above 40°C. Thus, thermal effects to the bacteria should be excluded. In the first experiments to treat bacteria films a glass object holder was coated with sterilized Escherichia coli film of about 100 μm thickness. After an exposure time of 30 s a destruction of the cell layer has been observed at a spot size of about 2 mm in diameter. The results demonstrate the non-thermal effect of the destruction of the bacteria by the plasma jet which is potentially applicable to human bodies. Further experiments utilizing living cells in vitro are under way to confirm these results. Here the influence of different treatment parameters is regarded.

ST 4.4 Mon 16:30 H 2033

Technique for a Sense of Touch inside the Head — •Ole Oehms[1], Marcus Radicke[1], Meinert Lewerenz[1], Sarah Wrede[1], Bernd Habenstein[1], Peter Trautner[2], Bernd Weber[2], and Karl Maier[1] — [1]Helmholtz Institut für Strahlen- und Kernphysik, Universität Bonn — [2]Life & Brain Research Center, Bonn

If a 30ms long Ultrasound (US) pulse is irradiated into a sample during a diffusion sensitive Magnetic Resonance Imaging (MRI) sequence, the US can generate contrasts in the image between tissues or liquids with different viscoelastic properties. If the US could be coupled through the cranium into the brain, this effect could possibly be used to visualize brain tumors or Alzheimer plaques. First measurements will be presented, which demonstrate the effect of the US on the MR image and the feasibilty of a coupling of the US through a model of a bone. The US frequency is tuned in such a way, that a resonance condition inside the bone occures. In this case, the US amplitude behind the bone rises enormously and the US effects on the sample can be visualized with the MRI scanner.