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ABSTRACTS

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nitrogen-containing cast steels are in austenitic (non-magnetic) condition. Due to a dendritic segregation, the structure of steel corresponds to a natural composite structure and it is remained on heating to high temperatures. After cold deformation with up to 85% reduction, the steel preserves the austenitic structure, and its hardness attains a level, close to the hardness level of the martensitic structure. The developed corrosion-resistant antimicrobial steels with the increased hardness can be used as a material for the surgical instrument.

FL:P11 **Evaluation of the Apatite Coating on Silicon Nitride Based Ceramics Sintered with RE2O3 Additives (RE = Y, La, Yb)**

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Silicon nitride ceramics have been successfully used as structural ceramics due to their suitable thermo-mechanical properties, such as high density, high thermal shock resistance, chemical stability and corrosion resistance. These characteristics allow the application of such materials in biomedical field, with a bioinert character. However, the deposition of a hydroxyapatite layer on the bioinert substrate promotes the bioactivity of these materials, so that the osteoconductivity can be improved. It is known that the sintering additives alters the microstructure of final sintered materials. Thus, this work aimed to study this influence on the superficial characteristics of Si3N4 materials after apatite coating. Si3N4 samples containing 9wt% additives (alumina and yttria, lantania or ytterbia) were prepared and sintered. Samples were evaluated with regard to density, microstructure and mechanical properties. The coating process was performed by sodium silicate and Simulated Body Fluid immersion. The coating was characterized by DRIFT, XRD and SEM/EDS The results indicate that a layer of hydroxyapatite could be deposited by biomimetic method on Si3N4 samples surface. Moreover, the rare earth used as sintering additive had influence on the characteristics of the coating.

FL:P14 **Osseointegration and Biocompatibility Study of Macroporous Biphasic Calcium Phosphate (BCP) Ceramics Oobtained by Consolidation Using Albumin**

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The potential of porous materials for applications in the medical, engineering and pharmaceutical areas has been widely reported. Several processing techniques have contributed to the progress in research involving porous biomaterials. To this purpose, a globular protein based (i.e. ovalbumin) consolidation approach has been proposed. In the present study, a porous hydroxyapatite: B-tricalcium phosphate - biphasic ceramics (BCP), was processed by consolidation using the protein-action technique. The processed porous ceramic exhibited appropriate pore configuration in terms of size, morphology and distribution. BCP cylindrical samples were implanted in female rabbits tibia to evaluation of the initial biocompatibility and osseointegration for 30 days period. The morphological analyses, optical microscopy and scanning electron microscopy evaluated the osseointegration. A rough surface pattern displayed by the ceramics seemed to have improved cell adhesion and proliferation processes. Furthermore, the open porosity of samples was an essential requirement for a suitable bone-implant osseointegration. In conclusion, this study revealed that the porous matrices obtained, promoted suitable development for bone tissue growth and also properties for osseoconduction and osseointegration.

FL:P17 **Disperse Materials with Adjustable Curie Temperature for Antitumor Hyperthermia**

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Modern clinical hyperthermia trials are based on the superparamagnetic ironoxide (SPIO) nanoparticles and encounter the problem of the thermal inhomogeneity at the mean temperature 43 °C in the target volume. Even slightly higher temperature leads to the wide-spread necrosis of normal tissue while heating underdose yields recurrent tumor growth. The goal of this work is to introduce new materials as an alternative to SPIO-based particles and thus to launch a new platform for highly controllable hyperthermia cancer therapy. We have drawn attention to fine powders (200 nm) of silver doped lanthanum manganite La1-xAgyMnO3+δ (LAMO) with highly controllable Curie temperature in the temperature range 43-47 °C. A spray pyrolysis method was tried to obtain LAMO particles of spherical form. The water suspension of LAMO spherical particles reached the constant temperature 43 °C (during <1min) under the alternative magnetic field of 800 kHz. Thereby particles of LAMO demonstrate the clear thermostatic behavior for a long time what is necessary for cancer hyperthermia. According to the biocompatibility in vivo testing, spray pyrolysis LAMO particles were not lead the death of animals with doses up to 480 mg/kg.

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FL:P21 **Fiber Optic Capillary Microfluidic Sensor for Biotechnological Applications**

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Optical capillaries are used in capillary gas and liquid chromatography, capillary electrophoresis, absorbance spectroscopy, Raman spectroscopy etc. These micro-fluidic methods find applications in biotechnologies, medical diagnostic, drug discovery and environmental sciences. The sensing system we present uses as its sensing element a short section of a fiber optic capillary which is filled with the examined liquid, to which a local thermal stimulus is applied. The liquid samples volume is below 10-8cm3. The multiparametric information detected as a time domain transmitted intensity LED light signal is dependent on the index of refraction, the turbidity, the boiling point, the viscosity and the surface tension of the sample, and is extracted by neural network analysis of dynamic data from two local phase transitions induced by the heating pulse. The application of the system for the analysis of raw milk for the presence of bacteria and for quantitative analysis of bio-fuels is presented.

FL:P23 **Differential Cellular Responses to Superparamagnetic Iron Oxide Nanoparticles in Primary Fibroblast vs. Fibroblastic Cell Line**

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Superparamagnetic iron oxide nanoparticles (SPIONs) offer some attractive possibilities in biomedicine. SPIONs have led to various opportunities such as improving site-specific drug delivery, magnetic resonance imaging contrast enhancement, hyperthermia treatments and so on. In the present study, we synthesized differently surface-modified SPIONs and then investigated differential cellular responses to SPIONs with various functional groups in normal fibroblasts vs. L-929 fibroblastic cell line via evaluating in vitro cytotoxicity and genotoxicity of SPIONs. Fe3O4 SPIONs were synthesized by co-precipitating Fe3+ and Fe2+ with ammonium hydroxide. For conjugation with various functional groups, they were either functionalized by 3-aminopropyltrimethoxysilane and trisodium citrate or coated with thin layer of silica by tetraethoxysilane. The cytotoxicity and genotoxicity of prepared SPIONs to both fibroblastic cells were assessed by MTT and Comet assays, respectively. It was found that SPIONs affected differentially the cell survival and DNA damage in normal fibroblasts vs. fibroblastic cell line.

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FL:P25 **Investigation of Affinity Interactions with Frustrated Total Internal Reflection Method**

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The important aim for biomedical investigations is to extend the possibility of affinity interactions study. In this paper it is point at opportunity of using in U-shaped multimode cylindrical waveguide for investigation of affinity interactions between the proteins and antibodies. The proposed study investigates potential application of a short arched cylindrical optically homogenous waveguide of 0.5 - 5 mm in diameter, which greatly exceeds the diameter of the optical fiber, in capacity of the basis for an optical chemical sensor. Dimensions of the waveguide and radius of the bend are chosen to make the main part of luminous flux be in the mode of frustrated total internal reflection. This allows using the waveguide