International Workshop on Woman in Ceramic Science
(WoCeram2019)

April 7-9, 2019/ Budapest, Hungary
Novotel Danube Budapest

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resonance-antiresonance method. XRD studies showed all have perovskit tetragonal structure. The SEM analysis of the samples suggests that the average grain size increases with increasing sintering temperature which characteristic of the ceramics materials. The dielectric and piezoelectric properties were determined on ceramic discs. The dielectric properties as dielectric permittivity (ε_r), dielectric loss (tgδ), Curie temperature (T_C), the piezoelectric constant (d_{33}) and the electromechanical coupling factor (k_p) were obtaining. The dopant ceramic compositions sintered at 1250^0C showed hight dielectric and piezoelectric properties as, kp = 0.42, for x=0.01 and kp = 0.6 for x= 0.02. These values show that compositions can be used for sensor and actuator applications.

STRUCTURAL, PHOTOCATALYTIC AND PHOTOELECTROCHEMICAL CHARACTERISTICS OF ZNO NANOPARTICLES SYNTHESIZED BY A GLYCINE-NITRATE PROCESS

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Zinc oxide is a semiconductor material which still, after a century of scientific research, shows great potential in modern day utilisements such as heterogenous photocatalysis of organic pollutants and as a photoanode material for efficient water splitting and oxygen generation.
In this work zinc oxide was synthesized by a glycine-nitrate combustion process, which is a cheap, simple and efficient method for synthesizing transition metal oxides. The obtained powder was calcined at 400 and 500 °C and samples were characterized in detail using X-ray powder diffraction (XRPD), Fourier-trasform infrared spectroscopy (FTIR), Raman spectroscopy, field emission scanning electron microscopy (FESEM), photoluminescence spectroscopy (PL) and UV-Vis diffuse reflectance spectroscopy (DRS). Photoelectrocatalytic properties were investigated *via* electrochemical methods: linear voltammetry (LV), chronoamperometry (CA) and impedance spectroscopy (EIS).
The results show that the obtained samples are nanocrystalline wurtzite zinc oxide with no impurities, with average particle diameters of 33 nm (annealed at 400 °C) and 48 nm (annealed at 500 °C). Both samples show significant amounts of various crystal deffects. The determined zinc oxide band gap was lower than the band gap of bulk zinc oxide. Photoelectrochemical measurements revealed that this material is photostable and reactive to light. Water oxidation is enhanced by exposing the light.
Finally, photocatalytic properties were tested via determining kinetic parameters of organic pollutant decomposition. Both samples showed excellent photocatalytic activity by decomposing methylene blue and phenol.

HUMIDITY SENSING POTENTIAL OF IRON MANGANITE ($FEMNO_3$)

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Though different metal oxide systems have been investigated and applied in humidity sensing as resistive or capacitive ceramic humidity sensors new materials remain the subject of much research. Iron manganite (FeMnO3) has a bixybyite type structure with the cubic space group $Ia\bar{3}$. Iron manganite powder was obtained by solid state synthesis (milling in a planetary ball mill, calcination at

1000oC for 2 hours, milling) of starting hematite (Fe2O3) and manganese carbonate (MnCO3) powders mixed in a suitable ratio. Bulk samples were obtained by sintering green samples of pressed powder 8 mm in diameter at 1000oC for 4 hours. Thick film paste was obtained by mixing the powder with organic vehicles. Four layers were screen printed on test interdigitated electrodes on alumina substrate and fired at 900oC for 6 h. XRD analysis of bulk and thick film samples confirmed the formation of iron manganite with a perovskite structure. Scanning electron microscopy (SEM) analysis of freshly cleaved bulk samples showed a network of interconnected grains and pores. A similar structure was observed for the thick film sample surface. Change of complex impedance was monitored in a humidity chamber in the relative humidity range 30-90% at the working temperature of 25oC and frequency range 42 Hz to 1 MHz. In bulk samples at 100 Hz the impedance decreased from 32 (RH 30%) to 3 MΩ (RH 90%), while in thick film samples on test interdigitated electrodes it decreased from 8.24 (RH 30%) to 0.87 MΩ ((RH 90%). The thick film sensor response and recovery was several seconds and a low hysteresis value of 2.78% was obtained showing that iron manganite can successfully be applied for humidity sensing applications.

INVESTIGATION OF OLEIC ACID AS A SURFACTANT FOR RESINS MADE FROM HYDROXYAPATITE POWDERS FOR USE IN STEREO-LITHOGRAPHY.

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Hydroxyapatite (HAp) is a promising candidate for bone scaffold production. It is used extensively in bone scaffolds due to its likeness to natural bone mineral and ability to induce bone growth. Stereo-lithography or Dynamic light projection (D.L.P.) printing, an additive manufacturing technique based on photo-curable liquid resins, has been applied to produce custom bone scaffolds. However, the high viscosity of photo curable resins which contain a ceramic powder remains an issue for DLP printing. The high viscosity can cause uneven re-layering of the liquid resin during printing. This can result in the introduction of voids in printed components. Oleic acid has been used extensively as a surfactant in the gelcasting of oxide ceramics. This work aims to investigate the use of oleic acid as a surfactant to improve HAp resins for use in DLP printing is investigated. A synthetic HAp (Plasma Biotal, United Kingdom) was characterised to determine its particle size, crystallinity and morphology. The powder was coated with oleic acid in concentrations ranging from 1.0 to 3.0 wt. % with respect to the mass of the powder (0.67 – 2.0 mg/m^2 oleic acid with respect to the specific surface area of the powder). The coated powders were heat treated to ensure chemisorption of the oleic acid. The powders were then incorporated into a photo-curable resin at 37 wt. %. The rheological behaviour of the powder filled resins was characterised by shear viscometry and a sedimentation test. The cure depths of the resins were measured at various lengths of exposure to UV. Components were printed with the resins on a desktop DLP printer (Anycubic, China). The geometric accuracy of the components was determined by comparing the components' dimensions to those of the CAD models used

RESEARCH OF THE TRIBOLOGICAL PROPERTIES OF TIN + SIC COMPOSITE WITH USE CONTACT PROFILOMETRY

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Paper presents results of TiN+30%vol.SiC composite material studies. TiN powder produced by H.C. Starck with average grain size 1.3-1.9 μm and SiC powder produced by Goodfellow with average grain size 0,1-1 μm were used. Powders were homogenised with rotational speed 300 rpm by 1 h in Pulverisette 6 planetary mill produced by Fritsch. Prepared powder samples were sintered with use High Pressure – High Temperature Method (HP-HT). HP-HT sintering method was provided by high-