Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION VIII
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 23-25. September 2019.

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INV-MC 2

Ethyl cellulose based magnetic nanocomposite membranes

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The focus of this study is on the preparation and characterization of magnetic nanocomposite membranes for gas separation. Magnetic nanoparticles of strontium ferrite ($SrFe_{12}O_{19}$) were incorporated into ethylcellulose via solvent casting method, in order to promote oxygen diffusion against nitrogen. The influence of the nanoparticle content on the mechanical and separation properties of the nanocompositewas investigatedusing micro Vickers method and tensile test. In order to identify the structures formed by membrane processing, various analyzes were performed, such as scanning electron microscopy (FESEM), atomic force microscopy (AFM), and infrared spectroscopy with Fourier transformation (FTIR). The permeability of magnetic nanocomposite membranes was tested by monitoring the output pressure change of the nitrogen and oxygen mixtures, as well as pure nitrogen. It has been established that all of the starting components have remained intact during processing, indicating that an appropriate processing method was chosen. Nanocomposite membranes with a higher content of magnetic nanoparticles have shown a significant improvement in mechanical properties compared to pure ethylcellulose, with high permeability. These findings have shown that nanocomposite membranes based on ethylcellulose are an excellent candidate for gas separation.

INV-GE 1

High sensitivity characterization of the nonlinear electric susceptibility of glasses and glass-ceramics in the microwave range

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The 5G mobile communication standard aims to provide massive data rates to an increasing number of devices. This requires the use of higher frequencies and the efficient use of the available frequencies. A major challenge in the efficient use of frequencies is cross talk between channels due to passive intermodulation (PIM). Due to the large differences in the intensity of receiving and transmitting channels, even tiniest intermodulation levels need to be controlled. One source of intermodulation is the nonlinear response of dielectrics to the electric field. However, it is hard to characterize the intrinsic material nonlinearity as the nonlinearity of the setup itself produces intermodulation. Following a resonator method exciting eigenresonances of three coupled cylindrical dielectric resonators enables to measure nonlinear behavior at high field strengths and allows isolating the resonators' material nonlinearities from other intermodulation sources. The setup enables to measure a third order nonlinear term being 10^{-10} times smaller than the linear response at electric field amplitudes of a few V/mm. We report on the characterization measurements of the nonlinearity of glasses and glass ceramics.