Serbian Ceramic Society Conference

ADVANCED CERAMICS AND APPLICATION X

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, 26-27. September 2022.

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P1 **26.09.2022 (16.30-17.00 installation), 17.00-18.30 poster session CLUB SASA**

Flat band potentials and photocatalytic activities of alumina/zirconia composite ceramics

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Coupled oxide ceramic materials possess attractive properties, such as high surface areas, tunable pore size and shapes, various crystal structures, and a multitude of compositions, which endow them with potential applications in various areas of science and technology. Among these, porous zirconia-based ceramic materials, which can be considered as semiconductors with high band gap energy of ~5eV, have been the subject of intense research because of the potential new extensive use in photocatalytical degradation of organic pollutants.
In the scope of this study mesoporous coupled alumina/zirconia composites were synthesized via the sol-gel method, followed by heat treatment at 500°C, for 5h. The XRD pattern of composites has shown that the addition of zirconia disrupts the crystallinity of alumina. The composites with higher zirconia content are characterized by peaks of the tetragonal zirconia phase. On the basis of the calculated flat band potentials from Mott-Schottky plots and optical band gaps, the conduction and valence band potentials were estimated for the composite semiconductors. Photocatalytic activity of synthesized samples in the process of degradation of trichlorophenol was obtained and correlated with band potentials and optical properties.

P2

The electrochemical behavior of ion-exchange cu-alumina

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Alumina is often used as a support for various types of catalysts or electrocatalyst. The role of alumina was to provide a stable and large surface area for the active metal or metal oxide. As insulating material with high resistivity, alumina was considered to be electrochemically inactive. However, surface groups in the alumina enable a distinct electrochemical response that greatly depends on the type and the number of surface groups present in different alumina types.
The aim of this study was to investigate the response of different alumina types modified by cooper. Two alumina oxyhydrates with different water content, 3mol H_2O/ mol Al_2O_3 (gibbsite) 0.6 mol H_2O/ mol Al_2O_3 (α,γ-alumina phase), were used in this study. Copper modified alumina samples were prepared by ion exchange with a solution of $CuSO_4*5H_2O$. Cu-alumina samples were dried at at 110 ^oC overnight. The obtained samples were used as modifiers of the carbon paste electrode. Their electrochemical response toward