Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION XI
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, 18-20. September 2023.

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the integrity of hip implants with an aim to improve their performance and reliability. When the fracture mechanics parameter, i.e. the measure of toughness of the material in the presence of a finite length crack within the region pertaining to Hooke's Law, is the critical stress intensity factor K_{Ic}, linear elastic fracture mechanics can be applied in biomedical implant design made of ceramic materials. Fatigue fracture studies are aimed towards determining the factors influencing prosthesis behavior in real exploitation conditions. Results presented in this paper indicate that further studies should encompassed numerical analysis of mechanical properties of the materials using the complicated geometries of implants themselves.

INV24

Investigation of tungsten-carbide-oxideas the anode catalysts supports for the proton exchange membrane fuel cells

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A significant research efforts are directed towards the development of compact energy supply devices, so-called stacks of fuel cells, which might be located near or at the point of energy consumption. For widespread use, the most practical are fuel cells with proton exchange membrane, which produce clean electricity, heat and water, at low temperatures. The price of the catalyst limits the mass production and large-scale utilization of fuel cells. Within our research, non-stoichiometric tungsten-carbide-oxide ($W_xC_yO_z$) were developed as support for catalysts based on PtRu for PEM fuel cells. The conductivity, morphology and structure of the synthesized catalysts were investigated. Cyclic voltammetry, linear scan voltammetry and rotating disk electrode voltammetry were used to determine performance of obtained $PtRu/W_xC_yO_z$ catalysts. Special attention was given to the analysis of CO poisoning. The catalyst with the best performance (30% $PtRu/W_xC_yO_z$) has higher number of active sites for HOR and the highest interfacial region which contributes the improved CO tolerance, in relation to the other tested catalysts. By testing this catalyst as an anode catalyst in a single PEM fuel cell, a significantly lower power drop was obtained (16,3%) compared to a single fuel cell that uses commercial catalysts (35,3%). These results highlight the potential of $PtRu/W_xC_yO_z$ catalysts in mitigating performance degradation caused by CO poisoning in PEM fuel cells.