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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Surface characterization of aluminum pillared clay-supported cobalt

Biljana Milovanović[1], Sanja Marinović[1], Aleksandra Milutinović-Nikolić[1], Rada Petrović[2], Gordana Stevanović[1], Predrag Banković[1], Tihana Mudrinić[1]

[1]University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Department of Catalysis and Chemical Engineering, Njegoševa 12, 11000 Belgrade, Serbia
[2]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia

Our previous study demonstrated that cobalt content strongly affected the electro-activity of aluminum pillared clay-supported cobalt (CoAP) toward glucose oxidation. It was found that the electro-activity of CoAP increased with the increase of cobalt loading. However, at the 10 wt.% of cobalt content, the electro-activity significantly decreased. In the present study, the focus is on the investigation of the nature of the surface sites that might cause the difference in the electro-activity of CoAP. For this purpose, CoAP with 3 wt.% and 10 wt.% cobalt contents (x%CoAP, x=3 and 10) were characterized using FE-SEM and HR-TEM with EDX techniques, and XPS. The microscopic techniques coupled with EDX have shown that cobalt oxide nanoparticles were evenly distributed in both samples. However, the higher cobalt loading resulted in cobalt oxide agglomeration that led to larger particle sizes. The results of XPS confirmed the presence of Co (II) in the 3%CoAP. On the other hand, the presence of Co_3O_4 which contains both Co (II) and Co (III) was confirmed in 10%CoAP. It is clear from this study that the electro-activity of CoAP strongly depends on the oxidation state of cobalt. However, the effect of agglomeration and cobalt oxide particle sizes cannot be ruled out.
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Substitution of feldspars and quartz in ceramic batches by the granitic waste in the production of ceramic tiles

Milica Vidak Vasić[1], Nevenka Mijatović[1], Zagorka Radojević[1]

[1]Institute for testing of materials IMS, Bulevar vojvode Mišića 43, 11000 Belgrade, Serbia

The urge of replacing part of the ceramic batches' formulation recipes is of great environmental importance. This study details the potential of using granitic waste in the production of ceramic tiles. This waste is found in the dimensional stone quarries, belongs to sediments younger than granite, decomposes, and lacks mechanical strength. The material mainly contains feldspar (especially albite) and quartz, a low quantity of micas, and a minor amount of kaolinite. Such materials are considered cost-effective alternatives because they are suitable as fillers and fluxes for ceramic batches.
The study reveals the chemical and mineralogical composition of the granitic waste and composite materials (particle size distribution, XRF, XRD, FT-IR) containing 60 % raw ceramic clay and 40 % granitic waste. In addition, thermal behavior is followed by