



**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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- Basic Ceramic Science & Sintering
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**P48**

**Investigation of the possibility of application of mechanochemically activated sodium carbonate in environmental protection**

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There is a growing problem in the world of eliminating carbon dioxide and the atmosphere, which leads to the greenhouse effect, and causes a constant increase in the average temperature on Earth. Cutting large green areas in order to obtain space for cattle breeding is especially present in Brazil and Argentina. Increasing CO<sub>2</sub> concentrations and rising air temperatures are leading to the melting of large ice masses causing rising sea levels. That is why the issue of eliminating carbon dioxide from the air is a priority in environmental protection. Sodium carbonate samples were activated for 1 to 28 minutes in a vibro mill. The increase in the free surface area of the activated samples was monitored by the BET method, and the state of the crystal lattice by the diffraction method. The analysis of the results showed a significant increase in the free surface of the activated material as well as significant changes in the crystal structure of the samples due to grinding in a vibro mill. Such activation of sodium carbonate would enable a significant increase in the sorption properties of sodium carbonate and its application.

**P49**

**The evaluation of mixed Al,Co pillared catalyst in degradation of tartrazine dye in presence of peroxymonosulfate**

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In this work smectite pillared with mixture of aluminium and cobalt poly(hydroxo metal) cations (Al,Co-PILC) was synthesized and tested as catalyst in degradation of food dye tartrazine by peroxymonosulfate. The Al,Co-PILC was obtained using a common procedure consisting of the following steps: grinding, sieving, Na exchange, intercalation, drying and calcination. Co<sup>2+</sup> to (Al<sup>3+</sup>+Co<sup>2+</sup>) molar ratios in the pillaring solution was 10%. Catalytic tests were carried out in a semibatch reactor under stirring and constant temperature maintained by circulation of thermostatic fluid using Julabo MC 4 heating circulator. Initial dye concentration was 50 ppm in the presence of excess of peroxymonosulfate. Decolorization of tartrazine solution was monitored using UV-Vis spectrophotometry at  $\lambda_{\max} = 426$  nm. The influence of the mass of the catalyst and reaction temperature was investigated.

Catalyst mass and temperature increase were beneficial for dye degradation rate. The catalytic process at 30 °C reached 97% for 120 min and besides decolorization included further degradation of products of tartrazine oxidation. At 50 °C complete decolorization occurred for only 30 min. This work showed that application of smectite pillared with mixture of

aluminium and cobalt poly(hydroxo metal) cations as peroxymonosulfate activators for degradation of water pollutants is very promising.

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