



**Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION VII
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, 17-19. September 2018.**

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Oscillatory reaction as novel method in distinguishing bentonites

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In the chemical oscillatory reaction the concentrations of the reactants decrease and products increase in stepwise form, while the concentrations of intermediates oscillate with time. In this paper, the influence of different bentonites on Briggs-Rauscher (BR) oscillatory reaction was investigated. In BR the oxidation of malonic acid in the presence of hydrogen peroxide and iodate in acidic medium, catalyzed by manganese ions occurs. The same mass (0.25 g) of bentonite from different deposits: Wyoming (SWy-2), Texas (STx-1b), Bogovina (B) and Mečji Do (MD) were added to the reaction solution consisting of 7 ml $[\text{CH}_2(\text{COOH})_2]=0.28$ M, 5 ml $[\text{MnSO}_4]=0.04$ M, 5 ml $[\text{HClO}_4]=0.15$ M, 5 ml $[\text{KIO}_3]=0.38$ M, and 3 ml $[\text{H}_2\text{O}_2]=9.80$ M. The obtained results were compared with basic BR oscillogram without bentonite. According to the obtained results the effects of bentonite on an oscillatory dynamics can be divided into three groups. The first group consisted of SWy-2 that negligibly affected the duration of the BR oscillogram. In the second group were B and MD which quenched oscillatory behavior, while STx-1b in third group extended oscillatory period. The results revealed that BR oscillatory reaction could be used as novel method for distinguishing of bentonites.

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Electrochemical behavior of phenol and its derivatives on the electrodes based on inorgano/organo modified bentonite

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In this work glassy carbon electrode (GCE) was modified using previously prepared bentonites. Modification of bentonite was performed by replacing the exchangeable cations present in the natural bentonite with selected inorganic and organic cations, i.e. AlFeNi polyoxo cations and benzyltrimethylammonium (BTMA) cations, respectively. Obtained materials were denoted as AlFeNi-B and BTMA-B. GCE was modified by applying homogenous dispersion of either AlFe5Ni5-B or BTMA-B and 10 wt. % carbon black in the original Nafion® solution on the

electrode surface. The modified GCE were tested in the acidic solution of phenolic compounds (phenol-Ph, 2-nitrophenol-2-NP and 4-nitrophenol-4-NP) by cyclic voltammetry using both single and three-component solution. The modification of GCE led to significant improvement of the electrode stability. GCE modified with both AlFeNi-B and BTMA-B exhibited lower sensitivity toward 4-NP in comparison to Ph and 2-NP indicating improved selectivity of investigated electrodes. All oxidation peaks registered in each of the single solution, were obtained in the mixt solution as well. Voltammogram recorded using GCE modified with AlFeNi-B in the mixt solution exhibited more distinguished voltammetric peaks. These results suggest that AlFeNi-B could be used as a promising electrode surface modifier for simultaneous detection of the phenol and its derivatives.

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The acceleration of the state I→II transition phenomenon in Briggs-Rauscher reaction with tungsten-phosphate bronzes

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The Briggs-Rauscher (BR) reaction is probably visually the most dramatic oscillating reaction, in which the oxidation of malonic acid ($\text{CH}_2(\text{COOH})_2$) by a mixture of hydrogen peroxide (H_2O_2) and iodate (KIO_3) is catalyzed by a metal ion (usually Mn^{2+}) in acidic aqueous solution. However, it appears that oscillations are not the only interesting behavior in the BR reaction. After oscillatory regime occurred, depending on the initial concentrations the BR system may undergo a sudden transition from the state I (the state with low iodine and iodide) to the state II (the state with high iodine and iodide). Recently, it is found random behavior (5 min to more than 3 hours) of induction period for the state I→II transition phenomenon, called crazy-clock behavior. In this paper, the influence of tungsten-phosphate bronze, obtained by thermal treatment, on BR state I→II transition is investigated. Results obtained strongly suggest that increasing heterogeneity in the presence of tungsten phosphate bronze, enlarged nonlinear behavior and extremely shortening time for the state I to state II transition.

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