FIRST INTERNATIONAL CONFERENCE ON ELECTRON MICROSCOPY OF NANOSTRUCTURES

ELMINA 2018

ПРВА МЕЂУНАРОДНА КОНФЕРЕНЦИЈА О ЕЛЕКТРОНСКОЈ МИКРОСКОПИЈИ НАНОСТРУКТУРА

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August 27-29, 2018, Belgrade, Serbia

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FIRST INTERNATIONAL CONFERENCE

ELMINA 2018

PROGRAM & BOOK OF ABSTRACTS

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ELMINA 2018
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At the beginning we wish you all welcome to Belgrade and ELMINA2018 International Conference organized by the Serbian Academy of Sciences and Arts and the Faculty of Technology and Metallurgy, University of Belgrade. We are delighted to have such a distinguished lineup of plenary speakers who have agreed to accept an invitation from the Serbian Academy of Sciences and Arts to come to the first in a series of electron microscopy conferences: Electron Microscopy of Nanostructures, ELMINA2018. We will consider making it an annual event in Belgrade, due to this year's overwhelming response of invited speakers and young researchers. The scope of ELMINA2018 will be focused on electron microscopy, which provides structural, chemical and electronic information at atomic scale, applied to nanoscience and nanotechnology (physics, chemistry, materials science, earth and life sciences), as well as advances in experimental and theoretical approaches, essential for interpretation of experimental data and research guidance. It will highlight recent progress in instrumentation, imaging and data analysis, large data set handling, as well as time and environment dependent processes. The scientific program contains the following topics:

- Instrumentation and New Methods
- Diffraction and Crystallography
- HRTEM and Electron Holography
- Analytical Microscopy (EDS and EELS)
- Nanoscience and Nanotechnology
- Life Sciences

To put this Conference in proper prospective, we would like to remind you that everything related to nanoscience and nanotechnology started 30 to 40 years ago as a long term objective, and even then it was obvious that transmission electron microscopy (TEM) must play an important role, as it was the only method capable of analyzing objects at the nanometer scale. The reason was very simple - at that time, an electron microscope was the only instrument capable of detecting the location of atoms, making it today possible to control synthesis of objects at the nanoscale with atomic precision. Electron microscopy is also one of the most important drivers of development and innovation in the fields of nanoscience and nanotechnology relevant for many areas of research such as biology, medicine, physics, chemistry, etc. We are very proud that a large number of contributions came from young researchers and students which was one of the most important objectives of ELMINA2018, and which indicates the importance of electron microscopy in various research fields. We are happy to present this book, comprising of the Conference program and abstracts, which will be presented at ELMINA2018 International Conference. We wish you all a wonderful and enjoyable stay in Belgrade.

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The Effect of Alkaline Activator Molarity and Aging Time on the Structure of Inorganic Polymer

Marija Ivanović[1], Ljiljana Kljajević[1], Jelena Gulicovski[1], Bratislav Todorović[2], Adela Egelja[1], Vladimir Pavlović[3] and Snežana Nenadović[1]

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The goal of this research was to produce an environmental friendly, energy saving inorganic polymer using a metakaolin as a precursor. The clean technology which conserve the natural environment was employed for the production of these materials. The used kaolinite is clay obtained from Rudovci, Lazarevac, Serbia. Physicochemical properties of kaolin were investigated in previous work by Nenadović et al. [1]. Metakaolin (MK) was prepared by calcining kaolinite at 750 °C for 1 h. The influence of alkali activation, i.e. different concentration of NaOH as a component of alkali activator mixture on the process of polymerization of metakaolin is investigated. The alkaline solution was prepared from sodium silicate and 2M, 4M, 6M and 8 M NaOH (analytical grade) (volume ratio $Na_2SiO_3/NaOH = 1.6$). The inorganic polymer (IP) samples were formed from metakaolin and the four different alkaline solution (solid/liquid ratio was about 1), which were mixed for 15 min and then left at room temperature for one day. Finally, the mixture was kept in a sample drying oven for 2 days at 60 °C. Process of aging time of inorganic polymer samples at 7th, 14th, 21st and 28th days is followed by some analytical methods (XRD, FTIR). X-ray diffraction (XRD) and Fourier transformation infrared spectroscopy (FTIR) were used for characterization of metakaolin and metakaolin based inorganic polymers. After 28th days when the aging time were finished, on the surface of the samples were used scanning electron microscopy (SEM) with energy dispersive spectroscopy (EDS). XRD analysis almost of all inorganic polymer samples revealed their amorphous-like structure with the position of an amorphous halo in the range 18°-32°, which indicates short range ordering of the reference sample with crystalline admixture of SiO_2 (α-quartz, ICSD 89). The FTIR spectra of all samples shows a strong peak at ~1000 cm^{-1} which is associated with Si–O–Si asymmetric stretching vibrations and is the finger print of the geopolymerization [2,3]. The FT-IR results show a shift of the Si-O or Si-O-X bands as the molarity of activator increasing during polymerization process, where X can be Si or Al. Both methods and XRD, as well as FTIR, show greater sensitivity to monitoring the effects of molarity, than the aging time within the same molarity to structural changes in inorganic polymer. SEM micrographs (Fig.1) showed a denser matrix, and a lower content of unreacted metakaolin particles due to increasing of molarity of NaOH. Structural reorganization of inorganic polymer samples occurs during the curing or aging in accordance with a polymerization mechanism.

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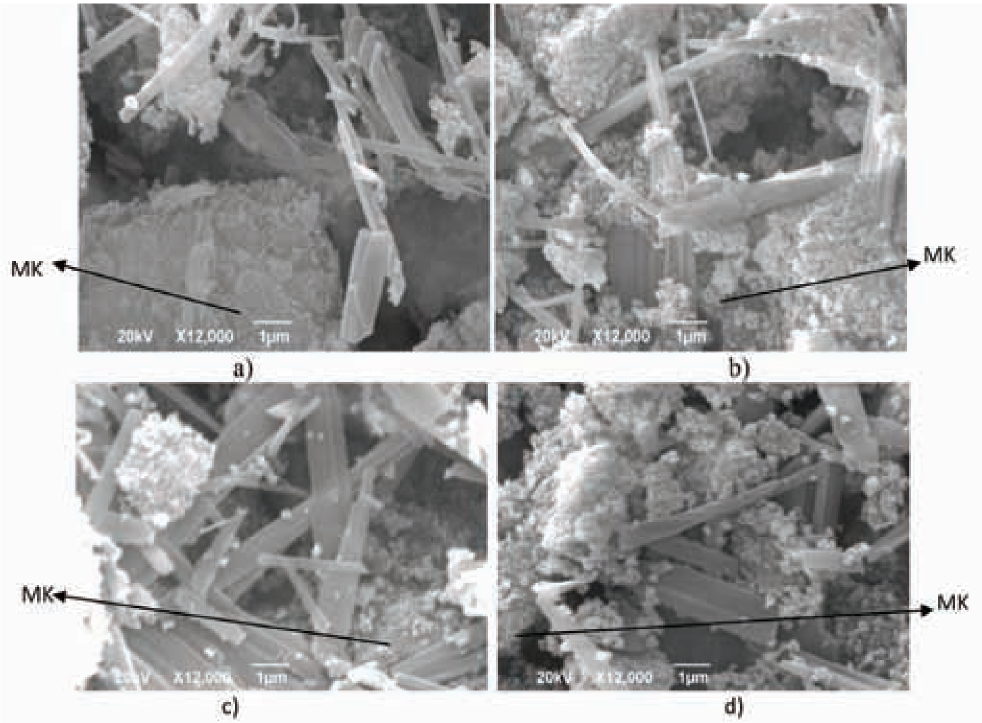

Figure 1. SEM micrographs of inorganic polymer: a) 2M NaOH b) 4M NaOH b) 6M NaOH d) 8M NaOH.

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