Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION VIII
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, 23-25. September 2019.

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Book title: Serbian Ceramic Society Conference - ADVANCED CERAMICS AND APPLICATION VIII Program and the Book of Abstracts

Publisher:
Serbian Ceramic Society

Editors:
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Dr Nina Obradović

Technical Editors:
Dr Ivana Dinić
Dr Marina Vuković

Printing:
Serbian Ceramic Society, Belgrade, 2019

Edition:
100 copies

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

666.3/.7(048)
66.017/.018(048)

SRPSKO keramičko društvo. Conference Advanced Ceramics and Application : New Frontiers in Multifunctional Material Science and Processing (8 ; 2019 ; Beograd)
Program ; and the Book of abstracts / Serbian Ceramic Society Conference Advanced Ceramics and Application VIII : New Frontiers in Multifunctional Material Science and Processing, Serbia, Belgrade, 23-25. September 2019. ; [organized by] Serbian Ceramic Society ... [etc.] ; [editors Vojislav Mitić, Lidija Mančić, Nina Obradović]. - Belgrade : Serbian Ceramic Society, 2019 (Belgrade : Serbian Ceramic Society). - 98 str. : ilustr. ; 30 cm

Tiraž 100.

ISBN 978-86-915627-7-9

а) Керамика -- Апстракти б) Наука о материјалима -- Апстракти в) Наноматеријали -- Апстракти

COBISS.SR-ID 279041804

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Friction at Nanoscale

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In many technical fields a contact between two surfaces is very important and often the subject of research. The numerous physical phenomena that occur at the contact between two materials indicate the complexity of the processes that take place at the macro, micro or nanoscale. Therefore, friction, lubrication and wear are the subjects that have been attracting attention for many years, especially as part of tribological investigations. The research has shown that these three components are of fundamental importance for surfaces in contact. The aim of this research is to describe friction, and lubrication as a process to control friction, especially at the atomic level. At the atomic and molecular scale there is apossibility to form very thin film with the property to spontaneously assemble themselves into ordered structures. One of the procedures to make these ultrathin organic films of controlled thickness is to prepare self-assembled monolayers. These monolayers are described as a model system to study boundary lubrication.

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High Frequency Magnetoimpedance Characterization of Fe-based Amorphous Wires

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In this work magnetoimpedance (MI) effect of Fe-based amorphous wires with nominal composition $Fe_{73}Cu_1Nb_3Si_{13.5}B_{9.5}$ is presented. The MI measurements were performed in the longitudinal direction of $\boldsymbol{l}$ = 15mm long and $\boldsymbol{d}$ = 150 mm of diameter samples. The impedance was measured by LCR HiTester by four-point method in an axial magnetic field produced by Helmholtz coils. MI effect is dependent on a skin-effect penetration depth $\boldsymbol{d_m}$, i.e. on the driving frequency $\boldsymbol{f}$ as well as on the external magnetic field $\boldsymbol{H_{ex}}$.

MI ratio defined as $DZ / Z = [Z(H_{ex}) - Z(H_{max})] / Z(H_{max})$ was investigated in dc magnetic field up to the maximum value of H_{max} = 7.42 kA/m. The frequency of MI-effect measurements ranged from 50 Hz to 4.5 MHz and sinusoidal current amplitude was $\boldsymbol{I_{cc}}$ = 7 mA.

Critical frequency of about 30 kHz (when $\boldsymbol{d_m} \approx \boldsymbol{d}/2$) was noticed as the point with the initial increase of the MI-effect. As the maximum MI effect was observed at f = 700 kHz, the high frequency magnetoimpedance characterization at $\boldsymbol{f} \in$ (700 kHz, 4.5 MHz) were performed.

Correlation between MI effect with electromagnetic skin effect i.e. penetration depth were examined. Possible applications as a weak magnetic field sensor were discussed in the sense of the anisotropy field H_k increase with driving frequency increase.