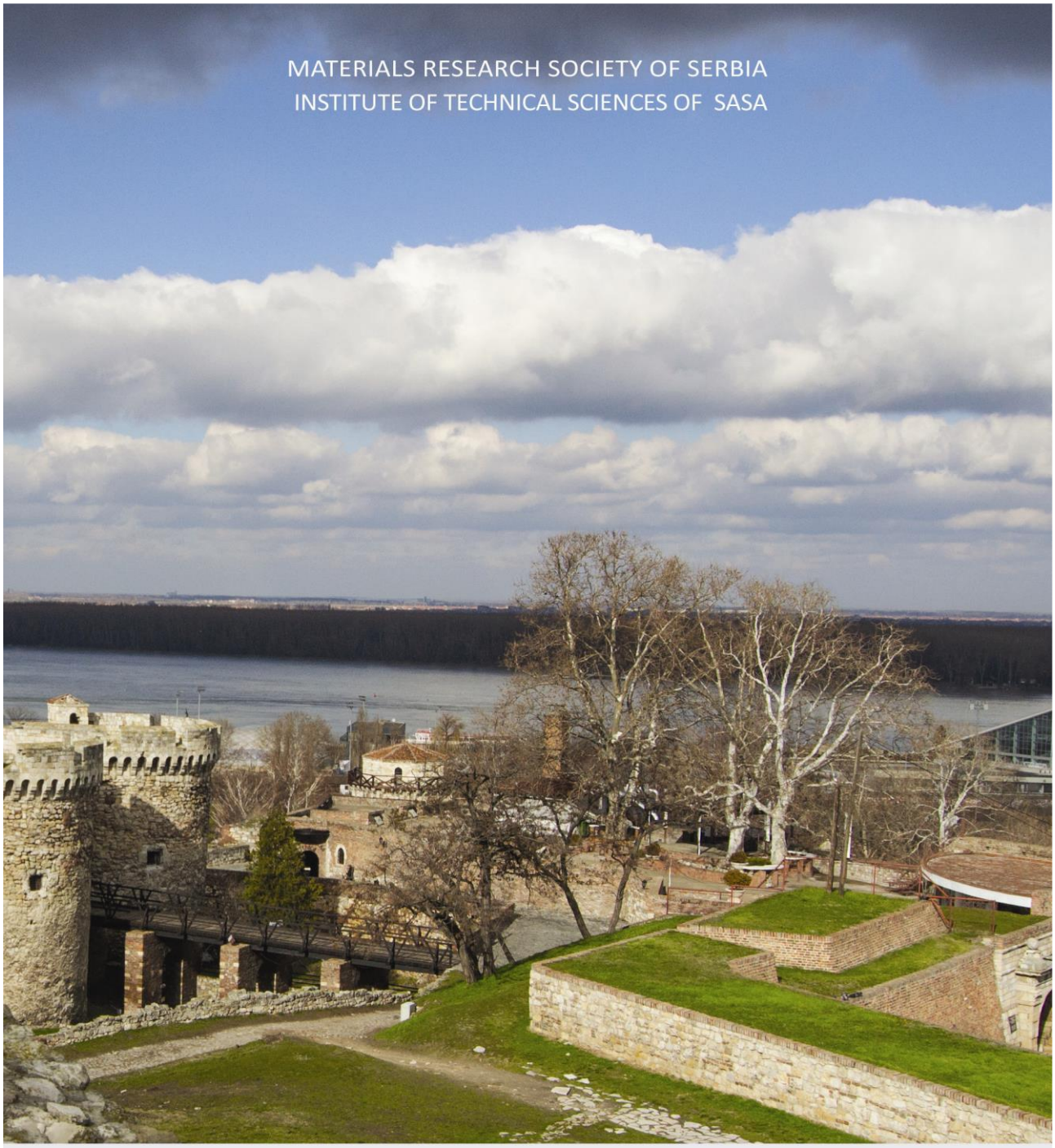

Programme and the Book of Abstracts

EIGHTEENTH YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

Belgrade, December 4–6, 2019

http://www.mrs-serbia.org.rs/index.php/young-researchers-conference

EIGHTEENTH YOUNG RESEARCHERS' CONFERENCE

MATERIALS SCIENCE AND ENGINEERING

December 4-6, 2019, Belgrade, Serbia

Program and the Book of Abstracts

Materials Research Society of Serbia
&
Institute of Technical Sciences of SASA

November 2019, Belgrade, Serbia

Book title:
Eighteenth Young Researchers' Conference - Materials Science and Engineering: Program and the Book of Abstracts

Publisher:
Institute of Technical Sciences of SASA
Knez Mihailova 35/IV, 11000 Belgrade, Serbia
Tel: +381-11-2636994, 2185263, http://www.itn.sanu.ac.rs

Editor:
Dr. Smilja Marković

Technical Editor:
Aleksandra Stojičić

Cover page: Aleksandra Stojičić and Milica Ševkušić
Cover: Modified Photo by Miloš Stošić; Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Бедеми_-_поглед_на_Ушће.jpg); Creative Commons Attribution-Share Alike 3.0 Unported license

Printer:
Gama digital centar
Autoput No. 6, 11070 Belgrade, Serbia
Tel: +381-11-6306992, 6306962
http://www.gdc.rs

Edition:
130 copies

CIP - Каталогизација у публикацији

Народна библиотека Србије, Београд

66.017/.018(048)

YOUNG Researchers Conference Materials Sciences and Engineering (18 ; 2019 ; Beograd)
Program ; and the Book of abstracts / Eighteenth Young Researchers' Conference Materials Sciences and Engineering, December 4-6, 2019, Belgrade, Serbia ; [organized by] Materials Research Society of Serbia & Institute of Technical Sciences of SASA ; [editor Smilja Marković]. - Belgrade : Institute of Technical Sciences of SASA, 2019 (Belgrade : Gama digital centar). - XX, 102 str. : ilustr. ; 23 cm

Tiraž 130. - Registar.

ISBN 978-86-80321-35-6 (ITSSASA)

а) Наука о материјалима -- Апстракти б) Технички материјали – Апстракти

COBISS.SR-ID 281006348

7-3

Study of electrical behavior of polymer-nanotubes composites

Dmytro Lykashevych[1], Illia Zhydenko[2], Dmytro Chalyy[2], Ivan Karbovnyk[3], Halyna Klym[1]
[1]Lviv Polytechnic National University, Lviv, Ukraine, [2]Lviv State University of Life Safety, Lviv, Ukraine, [3]Ivan Franko National University of Lviv, Lviv, Ukraine

Nanocomposites into polymer matrix are known to have extraordinary mechanical, thermal and electrical properties. Among such nanocomposites of significant interest are PEDOT:PSS polymer matrices with carbon nanotubes. In this of work we analyze electrical behavior of PEDOT:PSS layers with high-purity single-walled (SWCNTs) or multi-walled carbon nanotubes (MWCNTs).

Electrical studies were performed using E7-20 RLC measuring instrument. This instrument is designed to measure the parameters of samples represented by a parallel or serial two-element equivalent circuit. Harmonic voltage (1 V) in the frequency range from 1000 Hz up to 1 MHz was used as an excitation signal. The instrument ensures the 3% accuracy of impedance absolute value measurements. To see the difference in the electrical performance of obtained samples, impedance tests were carried out. Based on the readings from E7-20 instrument, which initially measures absolute value of the impedance of the sample and phase angle between applied voltage and current through the sample, we have recalculated real and imaginary parts of the impedance.

It is established that all investigated samples show lowest impedance (highest conductivity) at room temperature and electrical conductivity decrease upon cooling. General trend is that Re(Z) slightly increases with frequency from 1 kHz to up to some threshold frequency and then drops rapidly. This threshold frequency for pure PEDOT:PSS and PEDOT:PSS/SWCNTs samples is about 100 kHz and is somewhat lower for composite layers with MWCNTs.

Most notable temperature effect on the real part of the impedance of fabricated polymer/CNTs composite layers is that Re (Z) increases drastically starting from certain temperature, which is different for samples with different composition. For pure polymer this occurs already at 80…90 K and below 60 K Re (Z) is almost out of the measurable range. For layers reinforced with SWCNTs, increase of impedance is more gradual and even more so for MWCNTs-reinforced composites. In the latter case, reliable measurements can be performed even at temperatures as low as 40K.