

INSTITUTE OF TECHNICAL SCIENCES OF SASA
MATERIALS RESEARCH SOCIETY OF SERBIA

Programme and the Book of Abstracts

**TWENTY-FIRST YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING**

Belgrade, November 29 – December 1, 2023



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&
Institute of Technical Sciences of SASA**

2023

Book title:

Twenty-First 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>

Conference organizers:

Materials Research Society of Serbia, Belgrade, Serbia
Institute of Technical Sciences of SASA, Belgrade, Serbia

Editor:

Dr. Smilja Marković

Technical Editor:

Aleksandra Stojičić and Dr. Ivana Dinić

Cover page: Smilja Marković

Cover: Nebojša Labus

Printing:

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

Publication year: 2023

Print-run:

120 copies

CIP - Каталогизација у публикацији

Народна библиотека Србије, Београд

66.017/.018(048)

YOUNG Researchers Conference Materials Sciences and Engineering (21 ; 2023 ; Beograd)

Program ; and the Book of abstracts / Twenty-first Young Researchers' Conference Materials Science and Engineering, November 29 – December 1, 2023, Belgrade, Serbia ; [organizers] Materials Research Society of Serbia & Institute of Technical Sciences of SASA ; [editor Smilja Marković]. - Belgrade : Institute of Technical Sciences of SASA, 2023 (Belgrade : Gama digital centar). - XX, 99 str. ; 23 cm

Tiraž 120. - Registar.

ISBN 978-86-80321-38-7

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

COBISS.SR-ID 130053385

9-7

**Preparation of dispersion strengthened nanocomposite with Al₂O₃ and MgO particles
by spark plasma sintering**

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Nanocomposites are multiphase materials in which at least one of the structural compounds has a size below 100 nm. The subject of this work is creation of a dispersion-strengthened nanocomposite (DSC) with copper matrix. There are many dispersions that are possible to be used in DSC with copper matrix, such as Al₂O₃, Y₃O₂, TiO₂, and WC. In this work we used Al₂O₃ due to the possibility of making even dispersion in the material and its economical availability. Such composites exhibit thermal stability of their mechanical properties up to 900 °C for at least 1 hour exposure, which opens new possibilities for use of such materials in high-temperature, high-strength applications. Materials created by our team exhibited good mechanical properties, namely hardness, which was up to 136 HB; however, it has to be noted that amount of dispersion particles had a direct effect on the hardness of the composite. Properties of the DSC's are also dependent on the method of its preparation and compactization. Composites in this work were prepared by powder metallurgy method and sintered by spark plasma sintering, which allowed these composites to reach 99% density. Furthermore, DSCs were tested for their thermal stability, and their properties were evaluated and compared even with precipitation-strengthened copper-chrome material in order to show potential of possible usage of DSCs in spot welding applications, which require high strength, hardness, and electric conductivity.