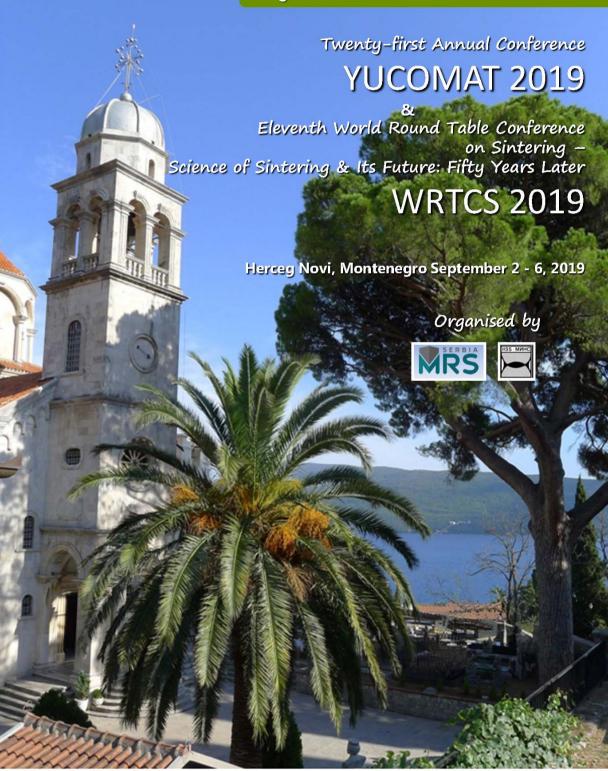
Programme & The Book of Abstracts

















Twenty-first Annual Conference YUCOMAT 2019

&

Eleventh World Round Table Conference on Sintering

WRTCS 2019

Programme and The Book of Abstracts

Organised by:

Materials Research Society of Serbia

&
International Institute for the Science of Sintering

Title: Twenty-first Annual Conference YUCOMAT 2019 &

Eleventh World Round Table Conference on Sintering

WRTCS 2019

Programme and The Book of Abstracts

Publisher: Materials Research Society of Serbia

Knez Mihailova 35/IV, P.O.Box 433, 11000 Belgrade,

Serbia

http://www.mrs-serbia.org.rs

Editors: Prof. Dr. Dragan P. Uskoković and Prof. Dr. Velimir R.

Radmilović

Technical editors: Maja Jovanović and Jasmina Jevtić

Cover page: Nenad L. Ignjatović

Front cover: Image is the property of MRS Serbia

Back cover: Modified Photo by Vlada Marinković; Wikimedia Commons

(https://commons.wikimedia.org/wiki/File:Belgrade iz balona.jpg); CC BY-SA 3.0

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Science of Sintering



Printed in: Biro Konto

Sutorina bb, Igalo – Herceg Novi, Montenegro

Phones: +382-31-670123, 670025, E-mail: bkonto@t-com.me. Circulation: 220 copies. The end of printing:

August 2019

Twenty-first YUCOMAT 2019 & Eleventh WRTCS 2019

Herceg Novi, September 2 - 6, 2019

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ACKNOWLEDGEMENTS

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Twenty-first YUCOMAT 2019 & Eleventh WRTCS 2019

Herceg Novi, September 2 - 6, 2019

W.Y.O.S.3.

Sintering process optimization for Cu-Al₂O₃ powders synthesized by novel method

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This paper presents sintered materials for use as contacts produced via novel synthesis method of starting powders by combination of explored conventional routes of thermochemical synthesis and mechanical alloying.

Starting raw materials for powder synthesis by thermochemical route were soluble salts, nitrates of copper and aluminum of p.a. quality, dissolved in distilled water (50wt.% solution) in suitable ratio for final powder to contain 50wt.% of Al₂O₃ in structure. Nitrate solution was spray dried and subjected to heat treatment (900 °C/1h). Obtained oxides were reduced in hydrogen atmosphere (flow rate 20L/h at 350 °C for 1h) in order to obtain composite of Cu-Al₂O₃. Produced powders were used for mechanical alloying of atomized copper (5h, 300 min-1). Final amount of alumina Al₂O₃ in composite powder were 1, 1.5 and 2 wt.%. After mechanical alloying obtained powders were compacted by a uniaxial pressing (8×32×3mm, 500 kN). Sintering of samples was performed in hydrogen atmosphere in isothermal conditions at five different temperatures in the range from 725-925 °C for 15 to 120 min.

Results of characterization show, that increase of Al_2O_3 content has more noticeable effect on the electrical conductivity and hardness than sintering temperature and time. With increase of Al_2O_3 from 1 to 1.5 wt.% there is a slight decrease in both investigated properties, while with increase up to 2 wt.% Al_2O_3 significant decrease in electrical conductivity and hardness of sintered samples is observed.

According to achieved results optimum sintering parameters for composite materials produced by novel synthesis method based on copper with dispersed 1% Al₂O₃ are 875 °C/60 min.

Based on the achieved results, this method provides production of contact materials with good combination of electrical and mechanical properties, but with estimated lower production costs.

Acknowledgements: Financial support for presented research was provided by Ministry of Education, Science and Technological Development, the Republic of Serbia, project TR34033.

CIP- Каталогизација у публикацији Народна библиотека Србије

66.017/.018(048) 621.762.5(048)

DRUŠTVO za istraživanje materijala Srbije (Beograd). Godišnja konferencija (21; 2019; Herceg Novi)

Programme; and The Book of abstracts / Twenty-first Annual Conference YUCOMAT 2019 & Eleventh World Round Table Conference on Sintering WRTCS 2019, Herceg Novi, Montenegro, September 2-6, 2019; organised by Materials Research Society of Serbia & International Institute for the Science of Sintering; [editors Dragan P. Uskoković and Velimir R. Radmilović]. - Belgrade: Materials Research Society of Serbia, 2019 (Herceg Novi: Biro Konto). - XLVIII, 174 str.: ilustr.; 23 cm

Tiraž 220. - Bibliografija uz pojedine apstrakte. - Registar.

ISBN 978-86-919111-4-0

- 1. World Round Table Conference on Sintering (11; 2019; Herceg Novi)
- а) Наука о материјалима -- Апстракти б) Технички материјали -- Апстракти в) Синтеровање -- Апстракти

COBISS.SR-ID 278510092