

**TWENTY-THIRD ANNUAL CONFERENCE  
YUCOMAT 2022  
&  
TWELFTH WORLD ROUND TABLE CONFERENCE  
ON SINTERING  
XII WRTCS**

**Hunguest Hotel Sun Resort, Herceg Novi, Montenegro  
August 29 - September 2, 2022**

**Program  
and  
the Book of Abstracts**

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**Materials Research Society of Serbia  
&  
International Institute for the Science of Sintering**

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## WELCOME SPEECH BY THE PRESIDENT OF MRS-SERBIA & IISS

**Dear Colleagues, Ladies, and Gentlemen,**



It is my great pleasure to greet you on behalf of the organizers of the Materials Research Society of Serbia (MRS-Serbia) and the International Institute for the Science of Sintering (IISS) and welcome you to the 23rd YUCOMAT and the 12th World Round Table Conference on Sintering (WRTCS). I wish for the rewarding program of the two parallel conferences, a plenty of pleasant conversations with other participants, and wonderful walks in this beautiful city where we have enjoyed the hospitality of our hosts for many years now.

In the long history of organization of YUCOMAT and WRTCS, the last three years may have been the most dramatic. They have entirely changed everything we know about the organization of our special "Herceg Novi Gordon Research Conferences" with great plenary speakers and 80% of foreign participants. First, we postponed YUCOMAT 2020 to 2021 at the last moment due to the COVID-19 pandemic, when it became obvious that proceeding with it would be risky for everyone. Last year we held YUCOMAT 2021 with a smaller number of plenary sessions and about a hundred participants, full of hope that we were finally free of COVID, which would make our lives easier, just as it was before the pandemic. And indeed, by the end of 2021, we had 25 confirmed plenary speakers for YUCOMAT and 10 for WRTCS.

However, things suddenly got complicated. Not only did we not get rid of COVID, but another global threat emerged with the war in Ukraine. Since March we have been overwhelmed with a series of cancellations of plenary sessions for both Conferences, and we have also experienced a smaller number of applications for oral and poster presentations than the anticipated. The feeling of uncertainty is ever-present. Having learnt from the last year's experience, I am afraid that we would not know the real situation before the conference starts to take place.

The Program includes 13 plenary speakers for the YUCOMAT Conference, 3 of which will have an online presentation, and 7 for the WRTCS. The number of oral and poster presentations is about 150, of which 47 is from Serbia, 31 from Ukraine, 17 from the Czech Republic, 11 from Poland, 8 from South Korea, 6 from Turkey, 4 from Montenegro, 3 from Latvia and 3 from Slovenia, whereas 9 more countries are represented by 1 or 2 presenters each. Compared to the years prior to 2021, when most of the researchers came from the USA, the European Union, and the Far East, the structure of the participants is similar to the last year, when most participants came from Serbia, the Czech Republic, and Poland.

This year's winner of the MRS-Serbia Award for Lasting and Outstanding Contribution to Materials Science and Engineering is Richard W. Siegel, Rensselaer Polytechnic Institute Professor, Member of the International Advisory Board of our Society, and a plenary speaker at many YUCOMAT Conferences. He is a scientist and innovator with an enormous contribution to Materials Science and Engineering, and the complete nomination can be found in the Program and the Book of Abstracts. Professor Siegel is here and he will present his lecture to us a little later.

One of the important activities of our Society, ever since its establishment, has been the encouragement of young researchers through the competition for the best doctoral thesis between the two Conferences, and the best oral and poster presentations. The total number of winners so far is close to 100, with an almost equal number of domestic and foreign award winners (<https://www.mrs-serbia.org.rs/index.php/about-us-m/mrs-serbia-past-present-and-future-1995-2020>).

As of 2021, MRS-Singapore joined us in this activity, and now they also financially support 10 award winners. At this Opening Ceremony, immediately after this speech, last year's winners will receive a diploma and a small compensation. At this year's Conference, we have 47 young researchers, 31 competing for the best poster presentations and 16 for the best oral presentations. They will receive 10 awards in total and the winners will be announced at the Closing of the Conference on Friday.

It is my great pleasure to tell you that after fifteen years of inactivity, we have renewed the work of the International Institute for Sintering Science (<https://www.iiss-sci.org/index.php>). In 2019, together with YUCOMAT, we organized the 11th WRTCS and that was when we elected fifteen new active IISS members. This year, we have elected approximately thirty new members, including the full, the corresponding, and the honorary. From the time IISS was formed, in 1969, until now, a total of more than 200 distinguished "sinterers" were selected, which makes it a kind of an Academy. The total number of active members is currently more than 100, which gives us a hope and justifies our expectation of return to the old paths of glory. At the Managing Board Meeting on Tuesday, August 30, we will discuss how to make this happen. All suggestions are welcome.

Many participants from all over the world paraded through this and other halls within the YUCOMAT and the WRTCS conferences. During the 25 years of existence of MRS-Serbia, 4,200 lectures were held by authors from around 60 countries, of which more than 400 were plenary. The first Sintering Conference was held in 1969 at this very building, and despite the fifteen-year long hiatus, more than 2500 lectures were held in total, be it here, in Herceg-Novi, the cities of the former Yugoslavia or across Europe, North America, Far East, *etc.* The First Yugoslav-Ukrainian school (conference) was held in this hall on powder metallurgy in 1966, which, with the input of German and USA colleagues, formed the nucleus for the formation of IISS in 1969. At that time, researchers like I. N. Francevich, I. M. Fedorchenko, Ya. E. Geguzin, V. V. Skorohod, P. S. Kisliy, V. A. Lavrenko and others wrote bright pages of the sintering history. Many of their followers in Ukraine and abroad still do it.

To reduce the strained relations that might have arisen between Russian scientists and the international research community, immediately after the invasion of Ukraine, the Ministry of Science and Higher Education of the Russian Federation made a decision (March 21, 2022) that Russian scientists would not participate at international conferences in 2022. On the other side, in these difficult moments for our colleagues in Ukraine, about thirty of them will be with us, some here in the hall, some with online lectures. I want to take a moment and personally thank Drexel University, AFOSR, Office in London, and MRS-Serbia for the support given to our Ukrainian colleagues.

Finally, I wish us all a pleasant stay in Herceg-Novi, another successful and memorable conference, and of course, a safe journey home.

Sincerely Yours,

Dragan Uskoković

P.S.I.D.4.

### **Obtaining and characterising Cu-infused antimicrobial films formed from regenerated cellulose-CaCO<sub>3</sub> composite**

Aleksandra Ivanovska<sup>1</sup>, Nemanja Barac<sup>1</sup>, Vesna Radojević<sup>2</sup>, Petar Uskoković<sup>2</sup>, Đorđe Janačković<sup>1,2</sup>, Ernest Barceló<sup>3,4</sup>, Patrick Gane<sup>2,4</sup>, Mirjana Kostić<sup>1</sup>

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Cellulose and cellulose-CaCO<sub>3</sub> dopes were prepared by ultrasound dispersion of CaCO<sub>3</sub> (0, 0.26, or 0.65 w/w%) and dissolution of cellulose (13 w/w%) in ionic liquid 1-ethyl-3-methylimidazolium acetate at 90 °C. Thereafter, the films were obtained by rod casting over a pre-heated glass plate, together with methanol used as a regeneration agent. Subsequently, the films were washed in hot water (80 °C) to remove the residual ionic liquid solvent - a process that can be extended to recover ionic liquid for re-use. To impart antimicrobial properties to the cellulose-CaCO<sub>3</sub> composite films, selected samples of the wet films were treated with 10 mM CuSO<sub>4</sub> solution for different times (30, 60, and 120 min). Furthermore, half of these CuSO<sub>4</sub> treated films were subsequently treated with ascorbic acid to synthesise in situ Cu-based nanoparticles on the film surface. After drying whilst held under tension at room temperature, the films were characterised in respect to their mechanical properties as well as antimicrobial activity. The results revealed that, in the case of films treated for 30 min with CuSO<sub>4</sub> solution, the incorporation of 0.26 w/w% CaCO<sub>3</sub> correlated with an increase in the film hardness, while in the case where the treatment with CuSO<sub>4</sub> solution was performed for longer (60 min) this hardness trend was reversed. The elastic modulus decreased with increasing content of CaCO<sub>3</sub>. Only the films treated with CuSO<sub>4</sub>, and those with Cu-based nanoparticles, possessed excellent antimicrobial activity against the bacteria *E. coli*, *S. aureus*, and the fungus *C. albicans*. However, the results in the case of *C. albicans*, showed an additional dependence, in that films treated with CuSO<sub>4</sub> solution for 60 min demonstrated increasing antimicrobial activity against the fungus specifically with increasing CaCO<sub>3</sub> content.

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