

# Overview of the conference COIN2022 - Contemporary batteries and Supercapacitors, International Symposium, Belgrade 2022

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The Serbian Academy of Sciences and Arts hosted the participants of the symposium titled: "COIN2022 - Contemporary batteries and Supercapacitors – International Symposium Belgrade 2022", 1-2 June 2022. The symposium was organized by the University of Belgrade – Faculty of Physical Chemistry, Belgrade, Serbia, the National Institute of Chemistry, Ljubljana, Slovenia, the University of Montenegro, Faculty of Metallurgy and Technology, Podgorica, Montenegro and the Serbian Academy of Sciences and Arts, Belgrade, Serbia. The world-renowned leaders of large European projects and their coworkers, with the local and regional project leaders, coworkers and students, shared the activities and achievements in the field of energy storage and conversion. In addition, Alumni of the University of Belgrade presented the results of their ongoing research. The conference covered different research and industrial perspectives in Europe and also educational activities within the prestigious MESC+ study program. Local project leaders and students were acquainted with possibilities of upgrading their skills and knowledge through postgraduate studies in the best European and world institutions.

**Keywords:** energy conversion, European project leaders, advanced studies

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BOOK AND EVENT REVIEW

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After commercialization in the 1990s, thanks to its high practical energy density, Li-ion battery became the influencing factor of everyday life. This battery is now the heart of countless number of portable electronic devices (mobile phones, tablets, laptops etc.), being today a common property of almost every man (in 2020, 45 GWh of energy was stored in Li-ion batteries in portable devices). From 2010., it is used as the propellant of electric cars, with the intention to replace all oil powered cars in the next few decades. The production rate of battery powered cars increased progressively and reached one million/year in 2017 and exceeded 6 million/year in 2021. Furthermore, in the near future, huge stationary battery packs should serve to buffer the oscillating energy output of solar and wind power plants. The inclusion of nanomaterials in the process of Li-ion battery production shifted its characteristics toward supercapacitor ones, and consequently, the supercapacitors are now the subjects of investigation as a fast-charging chemical power sources, alternative or supplement to batteries. However, the scarcity of raw materials for Li-ion batteries in the Earth's crust impels electrochemists to search for other types of batteries of similar usability and not limited by raw materials.

A group of distinguished European and domestic project leaders contributing significantly to the recent development of Li-ion batteries and supercapacitors and to their potential substitutes, met at the symposium entitled "COIN2022 - Contemporary batteries and Supercapacitors – International Symposium Belgrade 2022", held 1-2 June this year in the Serbian Academy of Sciences and Arts. The institutional organizers were the University of Belgrade – Faculty of Physical Chemistry, Belgrade, Serbia, the National Institute of Chemistry, Ljubljana, Slovenia, the University of Montenegro, Faculty of Metallurgy and Technology, Podgorica, Montenegro, and the Serbian Academy of Sciences and Arts, Belgrade, Serbia. Among distinguished invited speakers, we may mention French academician Prof. Patrice Simon, Université Paul Sabatier, Toulouse, France, Prof Cristian Masquelier, Université de Picardie Jules Verne, Amiens, France, Prof. Robert Dominko, National Institute of Chemistry, Ljubljana, Slovenia, and Kristina Edström, Uppsala University, Uppsala, Sweden. These world-renowned leaders of large European projects and their coworkers shared their activities and achievements in the field of energy storage and conversion. In addition, professors and researchers from the region presented the results of their ongoing research, and the particular attention was drawn to the presentation of the

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project regarding the construction of the first Gigafactory for Li-ion batteries production in Europe, (ElevenEs, [www.elevenes.com](http://www.elevenes.com)) located in Subotica. The conference program, including 14 invited lectures and 28 posters, covered different research and industrial perspectives in Europe and also educational activities within the prestigious MESC+ (Materials for Energy Storage and Conversion +) study program. This symposium was an excellent opportunity for local project leaders, their coworkers and students to learn about both actual and future European actions in the field of electrochemical energy storage, and to be acquainted with possibilities of upgrading their skills and knowledge through postgraduate studies in the best European and world institutions.

The Program and Book of Abstracts is available in printed form (ISBN 978-86-82139-86-7).



*Fig.1. The members of the Organizing Committee of the conference COIN2022 - Contemporary batteries and Supercapacitors– International Symposium Belgrade 2022 (from left to right): Prof. Robert Dominko, academician Slavko Mentus, Prof. Veselinka Grudić, Dr Milica Vujković*

*Sl. 1. Članovi organizacionog odbora konferencije COIN2022 – Savremene baterije i superkondenzatori – Međunarodni simpozijum Beograd 2022 (s leva na desno): prof. Robert Dominko, akademik Slavko Mentus, prof. Veselinka Grudić, dr Milica Vujković*

# Osvrt na simpozijum COIN2022 – Savremene baterije i superkondenzatori, međunarodni simpozijum, Beograd 2022

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## Izvod

Srpska akademija nauka i umetnosti ugostila je 1-2. juna 2022. učesnike simpozijuma pod nazivom: COIN2022 – Savremene baterije i superkondenzatori – Međunarodni simpozijum Beograd 2022. Simpozijum su organizovali Univerzitet u Beogradu – Fakultet za fizičku hemiju, Beograd, Srbija, Nacionalni hemijski institut, Ljubljana, Slovenija, Univerzitet Crne Gore, Metalurško-tehnološki fakultet, Podgorica, Crna Gora i Srpska akademija nauka i umetnosti, Beograd, Srbija. Svetski priznati rukovodioci velikih evropskih projekata i njihovi saradnici, sa lokalnim i regionalnim vođama projekata, saradnicima i studentima, razmenili su aktivnosti i dostignuća u oblasti skladištenja i konverzije energije. Pored toga, alumni Univerziteta u Beogradu predstavili su rezultate svog tekućeg istraživanja. Konferencija je obuhvatila različite istraživačke i industrijske perspektive u Evropi, kao i obrazovne aktivnosti u okviru prestižnog studijskog programa MESC+. Domaći rukovodioci projekata i studenti upoznati su sa mogućnostima unapređenja svojih veština i znanja kroz postdiplomske studije u najboljim evropskim i svetskim institucijama.

*Ključne reči:* konverzija energije, rukovodioci evropskih projekata, napredne studije

PRIKAZ KNJIGA I DOGAĐAJA

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Nakon komercijalizacije Li-jonske baterije 1990. godine, zahvaljujući svojoj visokoj praktičnoj gustini energije, ova baterija postala je faktor koji utiče na svakodnevni život. Ona je sada izvor energije bezbrojnih prenosivih elektronskih uređaja (mobilnih telefona, tableta, laptopova itd.), koji su danas u vlasništvu gotovo svakog čoveka (U Li-ion baterijama prenosivih uređaja 2020. godine uskladišteno je 45 GWh energije). Od 2010. godine koristi se kao pogonsko sredstvo električnih automobila, sa namerom da u narednih nekoliko decenija zameni sve automobile sa pogonom na tečna fosilna goriva. Godišnja proizvodnja automobila sa pogonom na baterije progresivno je rasla i dostigla više od milion u 2017., a premašila 6 miliona u 2021. Štaviše, u bliskoj budućnosti, predviđa se da će ogromni stacionarni baterijski paketi da služe za ublažavanje oscilirajuće izlazne energije solarnih i vetroelektrana. Uključivanje nanomaterijala u proces proizvodnje Li-jonskih baterija pomerilo je njene karakteristike ka superkondenzatorima, pa su superkondenzatori sada predmet istraživanja kao brzo punjivi hemijski izvori električne energije, kao alternativa ili dopuna baterijama. Međutim, nedostatak sirovina za Li-jonske baterije u Zemljinoj kori postavlja pred elektrohemičare urgentan zadatak da traže druge tipove baterija slične upotrebne vrednosti, čija proizvodnja neće biti ograničena dostupnošću sirovina.

Na simpozijumu COIN2022 – Savremene baterije i superkondenzatori – Međunarodni simpozijum Beograd 2022“, održanom 1-2 juna 2022. u Srpskoj akademiji nauka i umetnosti, sastala se grupa uglednih evropskih i domaćih rukovodilaca projekata koji su značajno doprineli novijem razvoju Li-ion baterija i superkondenzatora i njihovim potencijalnim zamenama. Institucionalni organizatori su bili: Univerzitet u Beogradu – Fakultet za fizičku hemiju, Beograd, Srbija, Nacionalni hemijski institut, Ljubljana, Slovenija, Univerzitet Crne Gore, Metalurško-tehnološki fakultet, Podgorica, Crna Gora i Srpska akademija nauka i umetnosti, Beograd Srbija. Među istaknutim pozvanim predavačima možemo pomenuti francuskog akademika prof. Patrice Simon, Universite Paul Sabatier, Toulouse, Francuska, Prof. Cristian Maskuelier, Universite de Picardie Jules Verne, Amiens, Francuska, Prof. Robert Dominko, Nacionalni institut za hemiju, Ljubljana, Slovenija i Kristina Edstrom, Upsala University, Upsala, Švedska.

Ovi i drugi svetski poznati rukovodioci velikih evropskih projekata i njihovi saradnici, govorili su o svojim aktivnostima i dostignućima u oblasti skladištenja i konverzije energije. Pored toga, profesori i istraživači iz regiona predstavili su rezultate svojih tekućih istraživanja, a posebnu pažnju privukla je prezentacija projekta izgradnje prve gigafabrike za proizvodnju Li-jonskih baterija u Evropi (ElevenEs, [www.elevenes.com](http://www.elevenes.com)), locirane u Subotici.



Program konferencije, kroz 16 pozvanih predavača i 28 posterskih prezentacija, obuhvatio je različite istraživačke i industrijske perspektive u Evropi, kao i obrazovne aktivnosti u okviru prestižnog studijskog programa MESC+ (Materials za skladištenje i konverziju energije +). Ovaj simpozijum je bio odlična prilika da domaći rukovodioci projekata, njihovi saradnici i studenti slušaju o aktuelnim i budućim evropskim akcijama u oblasti elektrohemijskog skladištenja energije, te da se upoznaju sa mogućnostima unapređenja svojih veština i znanja kroz postdiplomske studije u najboljim evropskim i svetskim institucijama.

Program i Knjiga sažetaka dostupni su u štampanom obliku (ISBN 978-86-82139-86-7).



*Sl. 2 Svečana sala Srpske akademije nauka i umetnosti. Otvaranje konferencije COIN2022 – Savremene baterije i superkondenzatori, Međunarodni simpozijum Beograd 2022*

*Fig. 2. Main Hall of Serbian Academy of Sciences and Arts. The opening section of the conference COIN2022 - Contemporary batteries and Supercapacitors, International Symposium Belgrade 2022*