

Preface for special issue: Energy storage and Enerstock 2021 "Towards Smarter Solutions"

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Preface for special issue: Energy storage and Enerstock 2021 "Towards Smarter Solutions" / Ristic, A., Stritih, U., Cabeza, L.F., Gerbaldi, C.. - In: JOURNAL OF ENERGY STORAGE. - ISSN 2352-152X. - ELETTRONICO. - 88:(2024), pp. 1-2. [10.1016/j.est.2024.111519]

Availability:

This version is available at: 11583/2994285 since: 2024-11-11T11:23:04Z

Publisher:

Elsevier

Published

DOI:10.1016/j.est.2024.111519

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Elsevier preprint/submitted version

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<http://doi.org/10.1016/j.est.2024.111519>

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Energy storage and Enerstock 2021 “Towards Smarter Solutions”

“15th International Conference on Energy Storage ENERSTOCK 2021”, June 9th - 11th 2021, Ljubljana, Slovenia

This virtual special issue gathers a selection of articles following contributions presented at the Virtual Enerstock Conference, which was held “virtually” in June 9-11, 2021 in Ljubljana, Slovenia. The conference was the 15th Enerstock conference organised by IEA – TCP ES (Technological Collaboration Programme Energy Storage), and hosted by University of Ljubljana - Faculty of Mechanical Engineering and the National Institute of Chemistry Slovenia. TCP ES facilitates integral research, development, implementation and integration of energy storage technologies such as: Electrical Energy Storage, Thermal Energy Storage, Distributed Energy Storage (DES) & Borehole Thermal Energy Storage (BTES), and is one of 38 Technology Collaboration Programmes (TCP’s) within the International Energy Agency (IEA).

At the conference, an impressive number of distinguished experts presented the latest scientific and technological achievements as well as future trends and prospects related to materials, applications and systems for thermal and electrical energy storage, power-to-gas or heat applications, climate change and other related disciplines. To share the expertise of the different research groups and provide a space for dialogue, also creating new opportunities for interaction and collaboration for the vast and heterogeneous scientific community, the congress has been organized into five main thematic sessions. Topics, which were covered, included:

- TES (Thermal Energy Storage), Materials development and Applications: synthesis, characterization, testing, sensible materials, phase change materials, thermochemical materials, residential, commercial industrial use, low, medium, high temperature, heating, cooling, dehumidification, district heating, CHP, heat pumps, chillers, renewable energy.
- EES (Electrical Energy Storage), Materials development and Applications: synthesis, characterization, testing, classic battery, flow batteries, fuel cells, residential, commercial, industrial use, e-mobility, electricity, electrolysis, grids, water splitting.
- Power to X: Materials and Applications: synthesis, characterization, testing for gas storage (hydrogen, methane, CO₂), liquid storage (methanol, ethanol...), power to gas, power to liquid, power to heat.
- Systems: system developments, components development, system integration, testing, optimization, engineering, control, safety, TES systems, battery, fuel cell systems, off—grid/grids systems, LCA, numerical and modelling aspects.
- Climate and policy: economy, management, regulatory aspects, market models, climate change.

The event aimed at further promoting the collaboration between the worldwide experts in the above detailed field of research, from fundamental studies to applied materials and devices. The objective of this virtual special issue is to capture timely, high-quality articles and, at the same time, to build up an ensemble of contributions closely correlated to the selected conference themes, thus emphasizing effectively the major role played within society and industry as a fundamental discipline for key applications and technologies, which will pave the way for future cleaner, greener and more sustainable society.

Initially scheduled in presence June 2021, following the successful Enerstock conference in Adana in 2018, the conference was moved to a virtual event due to the COVID-19 pandemic, as the restrictions made it not possible to ensure an in-person organisation, which we believe would have been the best formula to preserve the interactive nature of the event. Nonetheless, the event was successfully attended by about 250 researchers and experts from 28 countries from all over the world. According to tradition, special attention was paid to young researchers to facilitate their participation, helping to increase the visibility of

their work and facilitating the possibility of presenting oral contributions and discussing their future prospects through short oral - virtual poster sessions. Indeed, more than 50 young researchers participated at the conference, and the best Ph.D. student/post-doc contributions were evaluated and awarded the prizes by Dr. S. Vasta, the coordinator of the EERA JP ES SP3 (Thermal Energy Storage), during the closing ceremony. Moreover, the program included a range of exhibitions and updates from non-academic partners and the industry. We would like to take this opportunity to thank all of the presenters for their high-level scientific contributions to the conference. The dense and stimulating program was condensed into the Book of Abstract, available in electronic form for all participants and sponsors.

We were lucky to have sponsorship generously provided by the following industry sponsors TA instruments, Labtim, Micromeritics, HSE, ELES, PARR, PCM, HIDEN Isochema, PLUSS, who are here again deeply acknowledged because through their generosity, helped to make this event possible. Our thanks also go to the members of the Organizing and Scientific Committees and to all the staff in Ljubljana.

All submitted manuscripts underwent a rigorous standard review process. We greatly thank all of the Authors and Reviewers, who contributed to making this Virtual Special Issue an interesting reading for you all.

On behalf of International Energy Agency Technology Collaboration Programme Energy Storage, the University of Ljubljana - Faculty of Mechanical Engineering and the National Institute of Chemistry Slovenia we would like to thank you for your contributions leading to this successful conference, and we hope you enjoyed this conference at least as much as we enjoyed organizing it.

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