

Editorial Foreword

This is the final foreword of Issue 52 of the Superconductivity News Forum which contains highlights from a recent *Energy Reports* article and a large number of new presentations made at four different conferences: 15th European Conference on Applied Superconductivity (EUCAS 2021), 35th International Symposium on Superconductivity (ISS 2022), 2nd International Conference on Emissions Free Air Transport Through Superconductivity (EFATS 2022) and the Applied Superconductivity Conference 2022 (ASC 2022).

We include a Science and Technology Highlight about the recent review article by Calvin C.T. Chow, Mark D. Ainslie and K.T. Chau “High Temperature Superconducting Rotating Electrical Machines” which was published in *Energy Reports*. This is a thorough open access review about the wide activity deployed up to now related to a topic which has raised a strong interest among the applied superconductivity community. The review discusses the pros and cons of more than 100 models of rotating machines which have been proposed up to now based on different superconducting materials and also mentions the diverse applications expected from them.

The most recent set of pdf files corresponds to a selection of four invited presentations made at ISS 2022, a hybrid conference celebrated in Nagoya (Japan) in 29 November–1 December 2022. We include, first, a review of the past, present and future use of Rotating Machines Using High Temperature Semiconductors (Swarn Kalsi), then an electrodynamic suspension magnet made with Coated Conductor Tapes (Guangtong Ma), then a design of a HTS magnet for an Induction Heating Device (Satoshi Fukui) and, finally, of the advances in creating HTS Magnets for Spherical Tokamaks (Rod Bateman).

The next contributions of selected talks correspond to 14 presentations from ASC 2022. This was a very well attended conference having already a full personal participation which was celebrated in Honolulu (Hawaii, USA) in 23–28 October 2022. Unfortunately, participants from a few countries, like China, were still not able to attend the conference. We certainly hope that the normalization of celebrating conferences with full participation of members from all the countries will become a reality. Our selection of contributions from ASC 2022 includes 1 plenary with a video link and 9 invited talks, as well as 4 presentations from awarded students.

In the Electronics section of ASC 2022 we have selected four presentations related to a contribution to a Superconducting Quantum Computing Technology Roadmap (Scott Holmes), two additional contributions to quantum technologies (Christopher Ayala and Akira Fujimaki) and, we complete this section with a contribution from Sergey Tolpygo related to the development of planarized NbN layer electronics. Additionally, two contributions from awarded students also relate to electronics (Jennifer Volk and Ashish Shukla).

Concerning Materials and Large Scale applications, we include the plenary talk by Lance Cooley about the challenges in assuring manufacturing conductors for magnets, an

invited presentation by Patrik Vonlanthen related to the development of Ultra-High-Field NMR magnets, a second invited presentation by Luca Bottura who discusses the new opportunities opened by HTS conductors and a third invited talk reviewing the progress in the novel ultrafast growth process to prepare YBCO coated conductors by Xavier Obradors. Related to materials development, we include as well one contribution from the awarded student Laura Wheatley related to a nanoscale tomography analysis of Nb₃Sn wires and another one by Jacob Rochester showing how to generate oxide artificial pinning centers in Nb₃Sn wires.

A third group corresponds to a selection of 11 presentations made at EFATS 2022, a hybrid conference celebrated in Glasgow (U.K.) in 30–31 August 2022. This conference covers a wide spectrum of aspects related to the new topic of considering HTS materials and systems as competitive inputs for the big challenge of having sustainable electric aircrafts. The conference was attended by academic and industrial partners and several of them have been included in this issue. A wide list of topics was covered: REBCO coated conductors, MgB₂ wires, cables, motors, magnets, cryocoolers.

A final selected talk is an additional contribution from the virtual conference EUCAS 2021 celebrated in Moscow in September 2021. It corresponds to the plenary talk made by Tabea Arndt and Mathias Noe from KIT which is devoted to the expected impact of high temperature superconductors in the challenge of achieving a green energy system.

We hope that you will find the content of the final SNF Issue 52 informative and interesting.

Xavier Obradors and the SNF Editorial Team