Foreword

Special issue featuring papers from the 13th International Conference on Tritium Science and Technology

Guest Editor

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I am delighted to present this *Fusion Science and Technology* (FST) special issue containing papers derived from the 13th International Conference on Tritium Science and Technology (Tritium 2022), hosted by the National Research and Development Institute for Cryogenic and Isotopic Technology in Rm. Vâlcea, Romania.

After overcoming several obstacles, including a six-month postponement, Tritium 2022 was finally held with a physical presence October 16–21, 2022, at the Radisson Blu Hotel in Bucharest, Romania. The conference served as a meeting place for many highly committed scientists who shared their knowledge in all relevant scientific fields concerning tritium, initiating and fostering future collaborations without borders.

Tritium 2022 was attended by 178 specialists from 13 countries around the world. The program included 15 plenary lectures and 70 oral scientific papers in parallel sessions, as well as 45 scientific papers in three poster sessions. It should be noted and appreciated that the conference was supported by strong partnerships with the American Nuclear Society, the ITER Organization, SNN Nuclearelectrica SA, and other major nuclear players worldwide, such as the United Kingdom Atomic Energy Authority (fusion power generation research), Kinectrics UK Ltd. (engineering and experiment development), Intelligent Business—Torion Plasma Corporation (tritium consulting), Mirion Technologies (analytical innovation and radiation safety), Eraly & Associés (elemental analyzer design and manufacturing), SDEC France (environmental technology solutions and radiation protection), Tyne Engineering Inc. (tritium detectors/monitors), Stirling Cryogenics BV (cryogenic systems), Air Squared Inc. (technological equipment—compressors and vacuum pumps), and Kyoto Fusioneering Ltd. (advanced technologies for commercial fusion reactors).

This special issue of FST features 42 peer-reviewed articles, including an invited lecture, which span almost all the topics covered at the conference. The papers in this issue are organized by topic as follows:

1. Invited lecture (1 article)
2. Containment, safety, and environmental impact (5 articles)
3. Decontamination and waste management (3 articles)
4. Water and air detritiation (3 articles)
5. Tritium processing (purification, isotopic separation, cryogenic distillation) (11 articles)
6. Tritium facilities and operation (3 articles)
7. Interactions with materials (6 articles)
8. Tracer technics and isotopic effects (1 article)
9. Measurement, monitoring, and accountancy (4 articles)
10. Tritium supply, transport, and storage (1 article)
11. Tritium breeding and extraction (2 articles)
12. Others (2 articles).

The three most active areas of research reported in this issue include tritium processing; interactions with materials; and containment, safety, and environmental impact. The distribution of articles by continent/country should also be mentioned, with the undisputed leader being Europe with 30 articles (Romania, 13; Germany, 7;

Great Britain, 4; Spain, 2; the Czech Republic, 2; Italy 1; and Portugal, 1). Japan follows with 6 articles, Canada with 4 articles, and the Republic of Korea and Kazakhstan with 1 article each.

These articles present information, research, theories, experiments, and interpretations of results on diverse subjects, including measuring tritium in stars (KATRIN), fusion reactor applications (ITER, JET, DEMO), tritium in fusion and fission reactors, interactions of materials with hydrogen isotopes, coatings and selective permeability, tritium measurement and accountancy, all methods of separation of hydrogen isotopes (AWD, CECE, LPCE, CD), tritium storage methods, tritium safety assessment methods, and environmental impact.

I would like to thank the authors for their hard work and willingness to write these manuscripts.

In the hope that every step we take for the future in learning how to harness tritium for the production of cheap energy will be shared with the scientific world for the benefit of all humanity, please enjoy reading this FST special issue. Let us next look forward to Tritium 2025, to be held in Ottawa, Canada.

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