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EDITORIAL: ATALANTE-2024, CONFERENCE ON NUCLEAR CHEMISTRY FOR SUSTAINABLE FUEL CYCLE

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ATALANTE 2024 is the conference named after the ATALANTE nuclear facility. It is organized every 4 years by the CEA to bring together the international community keen on improving the Nuclear Chemistry for Sustainable Fuel Cycles. This sixth edition was eagerly awaited after cancelling the 2020 edition due to the COVID-19 pandemic. The conferences feed on the rich contributions of international speakers, participants and key experts, as well as the knowledge and skills of the ATALANTE facility teams.



The ATALANTE facility is a unique nuclear chemistry laboratory of approximately 20,000 square meters dedicated to medium and high activity research and it received the prestigious distinction of "Nuclear Historic Landmark" awarded by the American Nuclear Society ANS in 2014. It is under the supervision of ISEC (Institute for sciences and technologies for a circular economy of low-carbon energies) at CEA Marcoule. ISEC is the leading institute for research on the nuclear fuel cycle in France, either for the treatment and recycling of spent fuels or the management of radioactive waste.

Bringing together most of the countries involved in fuel cycle researches, the ATALANTE conferences provide an opportunity to discuss the latest advances in the field over the course of an entire week. All issues related to the fuel cycle are addressed with parallel sessions: separation of actinides and fission products; actinide materials and nuclear fuels; waste conditioning and geological storage; analytical chemistry; molten salt chemistry; and actinide and fission products basic chemistry.

This edition has once again obtained the support of IAEA (International Atomic Energy Agency), testifying to its legitimacy and its very high recognition by the scientific community as an essential moment of international cooperation. We welcomed 310 participants, from masters students to emeritus experts, representing 18 nationalities and more than 60 research institutes. 110 oral presentations and 90 poster presentations were given.

Christophe Jousot-Dubien, director of ISEC, hosted the opening ceremony. It was followed by plenary lectures by representatives of some of the world's leading nuclear research organizations. Clément Hill from IAEA, talked about a global overview of the fuel cycle back end. François Sudreau of CEA presented an benchmark of the French nuclear fuel program. Stephen Kung of DOE (Department of Energy, USA) spoke of nuclear fuel recycle in the office of nuclear energy. Then, Paul Nevitt of NNL (National Nuclear Laboratory, UK) presented the future fuel cycles from a UK perspective. These high level lectures provided the audience with an overview of international research in chemistry for the fuel cycle.



Presentations focused on new ways to separate actinides and fission products from the lab-on-chip to the factory scale, from new solvents to processes to deal with impurities. New materials and manufacturing were discussed as well as the newest knowledge for waste management and geological repository. Actinides and fission products chemistry were talked about from the molecular dynamics perspective to speciation in solvents

through radiation-induced effects. Presentations on pyrochemistry covered the whole fuel cycle. Finally, safeguard and analytical chemistry presentations focused on new methods from new reference materials to improvements of techniques.

As a preamble to the closing conference given by Eric Proust on nuclear energy for space exploration, the best poster awards were handed to outstanding students: Audrey Miles (Master's student at the University of Cambridge) and Mathéo Henry (PhD student at Institut de Chimie Séparative de Marcoule).



The last day of the conference was devoted to visiting the ATALANTE facility itself as well as the facilities dedicated to process engineering developments, and nuclear waste storage studies in Marcoule. 55 of the 310 conference participants visited laboratories, and discussed with ISEC researchers during this last day thanks to the support of the teams in place at the facilities.



This special issue of the ATALANTE-2024 proceedings includes papers from research teams worldwide, on separation process, fuel conversion and fabrication, analysis and safety assessments, or minor actinide storage.