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IMPRESS:
Pioneering the Future of Transmission Electron Microscopy

IMPRESS is a new EU-funded scientific project coordinated by the Consiglio Nazionale delle Ricerche (Italy), which aims to revolutionize the field of transmission electron microscopy.

Trieste, Italy – Science and innovation are joining forces in the project IMPRESS (Interoperable electron Microscopy Platform for advanced RESearch and Services), which officially launched on February 1st, 2023. This ground-breaking scientific project aims to advance the field of transmission electron microscopy (TEM) by co-developing and delivering new and sophisticated instrumentation, methods and tools, which will change how TEMs are used by both well established and new scientific communities. IMPRESS will also facilitate the integration of TEMs with other instruments, including those at analytical research infrastructures (RIs), while creating business prospects for small and medium-sized enterprises.

IMPRESS brings together 19 partners from 11 European countries, comprising scientists, companies, experts in the field of electron microscopy and research infrastructures, who will collaborate to address needs that are not yet satisfied by commercially-available electron microscopes.

The consortium met in Trieste from 14th to 17th February for the official launch of the project. IMPRESS is a research undertaking initiated by e-DREAM, the European Distributed REsearch infrastructure for Advanced electron Microscopy. The project plans to make a significant step forward in TEM by developing a new generation of instrumentation that is based on open standards, open interfaces, open components and open knowledge.

The core of IMPRESS: An open cartridge-based system

At the core of the IMPRESS project is the development of an interoperable platform based on a modular and standardized cartridge concept, which allows for flexibility and adaptability to different microscopes and instrumentation. This platform will facilitate a wide range of multimodal experiments, correlative workflows and methodological options, which are currently not available on commercially available electron microscopes.

The modular cartridges will be based on standardized interfaces and designed to be transferred interchangeably between sample and aperture planes on electron microscopes, across electron microscopes from different manufacturers, as well as to specimen preparation equipment and other characterization tools, including electrochemical techniques, surface science instruments and synchrotrons.

Furthermore, the project will focus on the co-development of new electron sources, techniques based on adaptive optics and event-driven detectors, application-relevant *in situ*/*operando* sample environments, as well as software for the simulation of experiments and remote access based on artificial intelligence.

The IMPRESS project has received funding from HORIZON EUROPE framework program for research and innovation under grant agreement n. 101094299.

Making TEMs more accessible and user-friendly

"Our goal is to design and deliver TEM instrumentation conceived at the highest level of open standards and interoperability. The architecture of this innovative platform will be based on interchangeable components that can be readily customized by scientists and further adjusted, taking into account the needs of users from different scientific communities. We aim to make TEMs flexible so they can be adapted to a diversity of multimodal experiments, instead of adapting experiments to TEMs," stated Regina Ciancio, the project coordinator. *"The IMPRESS project has the potential to make a breakthrough in the TEM market, as it aims to make advanced TEM instrumentation and tools more accessible and user-friendly for a wider range of scientific communities",* said Rafal Dunin-Borkowski, the project scientific coordinator.

In order to achieve this goal, IMPRESS will build a close dialogue with companies to adopt standard designs that can be adapted easily by any operator. It will exploit synergies and collaborate with five research infrastructures of European significance. In addition to the companies involved in the consortium, a pre-commercial procurement procedure will allow external companies to provide complementary expertise to co-develop innovative prototypes with targeted functionalities. This approach will create the ideal conditions to set up the IMPRESS innovation ecosystem.

"We are very much looking forward to seeing the results of this project and the impact that it will have on the TEM market and research community," concludes Regina Ciancio.

IMPRESS is a multi-disciplinary project, which brings together a team of partners from universities, research institutions and small and medium-sized enterprises from 11 European countries, including Italy, Germany, France, Belgium, Norway, Spain, Austria, the Netherlands, the Czech Republic, the UK and Finland. With funding of approximately 10 million Euros from the European Commission's Horizon Europe framework programme, the team of partners, which includes 5 research infrastructures of European significance (SOLEIL, ALBA, CERIC, Euro-BioImaging and ELI), will work on the project for the next 4 years.

For more information about the IMPRESS project, visit our website (www.e-impress.eu), contact us at secretariat@e-impress.eu and follow us on LinkedIn.

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