

Network for Actinide Sciences

Owing to security of supply and climate change issues, nuclear fission is likely to remain a significant part of

Europe's portfolio of energy sources for the foreseeable future. Although the nuclear industry employs a mature technology and operates nuclear plants with a high level of safety and efficiency, a major issue requiring intensive R&D is to secure a broadly agreed approach to waste management and, more generally, the exploration of new concepts for nuclear energy generation that make better use of fissile material and generate less waste. Fundamental actinide sciences play an important role in this context and are recognised as an essential basis for further development of this strategically important sector. Actinide sciences must be revitalised through Europe-wide networking, coordination and the utilisation of available research facilities and optimisation of research and training capacities.

ERA and Actinide science

Through radical changes to the way research infrastructure and human and other resources are managed and exploited, the ACTINET network is taking the initial steps needed to bring about a full and sustainable implementation of the European Research Area in the domain of physics and chemistry of actinides. To achieve this, three axes of action are envisaged: stimulating a global European infrastructure policy; defining shared and ambitious research programmes taking advantage of the available infrastructures; and joint efforts for training.

The ACTINET consortium includes 26 institutions from 14 European countries plus European Commission resources (JRC-ITU), bringing together major experimental facilities, academic and applied research expertise and capacities, and training experience.

Multi-site, multi-user resources, research and training

The network's first priority objective will be to pool together and operate, as multi-site and multi-user central resources,



*Hot-cell remote handling
(Courtesy: EC-JRC-ITU)*

selected components of the existing European infrastructure for handling and studying radioactive materials by carrying out joint research projects involving all members of the network. This requires implementation of improved regulations and procedures to allow for easy access to and use of the facilities, including mutual recognition of safety certification between the various ACTINET institutions; preservation of compatibility between users, in particular between academic ACTINET users and industrial partners; provision of accommodation for visiting research staff at ACTINET user facilities; implementing or adapting training for ACTINET researchers; exchanging scientific and engineering expertise to improve experimental set-ups to meet common ACTINET user requirements; improving compatibility and convergence of reference databases, software tools, and data processing methods, to enable better and easier comparison and interpretation of experimental results within the network; stimulating the complementarities of the national tools by designing and implementing coherent policies for their evolution and future development; and implementing a viable economic model for the operation of the multi-site user facility in the long term.

Joint research projects proposed by members of the ACTINET network will be evaluated by a scientific advisory committee prior to receiving support. Research projects supported by ACTINET will address all major fields of basic actinide sciences including: the chemistry of actinides in solution and solid phases; the geochemistry of actinides, and the physics and chemistry of irradiated actinide materials. These activities aim to improve our understanding of the complex phenomena that occur in nuclear fuels, in waste processing, and over the long term in radioactive waste disposed of in deep geological formations. They contribute to developing mechanistic and physically based actinide behaviour models which will provide complementary or alternative approaches to current techniques, with potentially important impacts on the techniques and practices used in the industry.

MANAGEMENT OF RADIOACTIVE WASTE

Cross-cutting research on radioactive waste management

Today, some academic centres retain both a teaching role and research programmes in actinide sciences, but support for renewing equipment and increasing staff numbers is often lacking and sometimes even the existence of courses in nuclear sciences is under threat. A portion of these teaching and training activities and associated resources will be placed under common ownership within the network. In particular, greater participation in training in universities is being planned by the national laboratories. Annual ACTINET summer schools, held alternately in ITU (Karlsruhe) and in CEA (Marcoule), will focus on specific fields within the actinide sciences.

Improved access to facilities, enable ambitious research

In a situation where there is a scarcity of available tools, establishing a shared European infrastructure policy will improve access to major actinide research facilities for the European scientific community. This will optimise the utilisation of existing experimental facilities and coordinate the deployment of future facilities at the European level.

The definition of shared ambitious research programmes, taking advantage of this access to up-to-date experimental tools, will reduce the fragmentation of the European community in actinide sciences and strengthen scientific excellence. Enhanced mobility and infrastructure availability for joint research programmes will allow the next generation of actinide scientists and engineers to gain important hands-on experience in a wide range of experimental techniques as part of their training. This will be a major benefit to an integrated European policy.

Safe and effective disposal, new technologies

Understanding fundamental actinide science is of major importance in ensuring that the disposal of high-level, long-lived radioactive waste is achieved as safely and effectively as possible. Actinide science can lead to the development of new disposal techniques that benefit health and safety and further reduce the risks to society. Fundamentally, it can also help deliver new nuclear fuel cycles that minimise production of high-level waste and increase the efficiency of nuclear power plants. No matter what the future is for nuclear power, current waste stocks and future quantities arising from a variety of technological and medical activities will remain a fact of life for future generations; it is important that society retains the knowledge, expertise and resources in actinide science to be able to deal with this material safely.

I N F O R M A T I O N

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There are two project Websites, one reserved for ACTINET partners and the following for public access:
<http://www.actinet-network.org>

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