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A Virtual Laboratory for education and training in nuclear and radiochemistry

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Nuclear and radiochemistry contains key knowledge and techniques needed by a modern society in order to address societal challenges including the energy sector, medical treatment and diagnosis, material sciences and dating. In order to maintain a high level of expertise, continued education and training is required on all levels using current digital media and attractive, efficient teaching concepts. To this end, A-CINCH develops state of the art virtual and augmented reality tools. One of these is the highly innovative Virtual Laboratory that allows students to perform a broad variety of NRC experiments virtually and repeatedly with Augmented Reality, Virtual Reality and as a web application. This includes analytical radiochemistry, radiopharmacy, a neutron irradiation facility and radiochemistry preparatory work of the nuclear fuel cycle.

In a 3D game fashion and by using elements of gamification, users can enter different laboratories, fulfill "tasks", gain levels and enter the next room. In a most realistic way, labware is handled, samples are prepared and measured. Radiation fields can be visualized, which is an advantage even over a real laboratory rising awareness for the precautions necessary when handling radioactive substances. The Virtual Lab can be used on its own or as an introductory training in preparation for a real world hands on training. This Virtual Laboratory is created as a user-friendly and easy-to-navigate application.

The A-CINCH project is the latest of four CINCH-based projects aiming on cooperation in education in nuclear chemistry and radiochemistry. In the first three projects, CINCH, CINCH-II and MEET-CINCH minimum requirements for bachelor, master and postgraduate programs to achieve approved NRC curricula were defined, a number of theoretical and practical courses were developed using hands-on and e-learning approaches and platforms. MEET-CINCH counteracted the massive lack of NRC expertise by building teaching package for high schools and a MOOC on NRC for the general public in order to attract young persons to the NRC field and convey them its fascination and relevance. New education and training approaches based on remote teaching, remote controlled RoboLab experiments, interactive screen experiments and the flipped classroom concept were developed and implemented. ECVET course modules are offered in an e-Shop adapted to the needs of end-users. The wide mix of e-learning and presence teaching in nuclear and radiochemistry education aims to increase the number of students and trainees in the field. To address the new target groups directly and efficiently attract the attention of the secondary school students, new didactical tools, suitable for today's youth, are used. These newly developed courses and tools and all previous CINCH results are accessible via the newly set up CINCH Hub platform.

Primary authors: Prof. PREIM, Bernhard (Otto-von-Guericke-Universität Magdeburg); Prof. WALTHER, Clemens (Leibniz Universität Hannover, IRS); Dr VAHLBRUCH, Jan-Willem (Leibniz Universität Hannover, IRS); Mr SAALFELD, Patrick (Otto-von-Guericke-Universität); Mr WAGNER, Sebastian (Otto-von-Guericke-Universität Magdeburg); POTTGIESSER, Vivien (Leibniz Universität Hannover, IRS)

Presenter: Prof. WALTHER, Clemens (Leibniz Universität Hannover, IRS)

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