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Recent SHE studies utilizing chemical and low-energy ion beam techniques at JAEA

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At the JAEA tandem accelerator facility, we are conducting experiments on nuclear chemistry and physics of heavy elements and developing associated apparatuses, utilizing the ability to use a variety of actinide targets and the abundance of available beam time.
In recent years, for chemistry studies, we developed an online isothermal gas-chromatographic device [1,2] and investigated the volatility of dubnium (Db, element 105) in the form of its oxychloride, $DbOCl_3$ [3]. For physics studies, we have obtained einsteinium (Es, element 99) material in 2017, 2019, and 2021 from Oak Ridge National Laboratory and carried out spontaneous fission studies of fermium (Fm, element 100) and mendelevium (Md, element 101) isotopes with an aerosol gas-jet coupled surface ion source (SIS) [4] followed by the Isotope Separator On-Line (ISOL) and the MANON detector system utilized for the first ionization potential (IP) measurements [5,6].
Towards future experiments at ISOL, we are developing a new ion source based on the Electron Beam Generated Plasma (EBGP) method [7]. The ion source will be used for the ionization of high-IP atoms/molecules such as a rutherfordium (Rf, element 104) halide which is difficult to ionize with the present SIS. Another development is a construction of a low-energy ion beamline at ISOL. We commissioned a Gas Cell ion beam Cooler and Buncher (GCCB) [8] using short-lived actinides and successfully converted 30 keV ISOL beams to low-energy ion beams which can be stored in an ion-trap based devices such as an MRTOF mass spectrograph.
In this talk, a status report of the activities above and prospects related to the future experimental program will be given.

References

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