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# Accelerator-Based Ion Beam Analysis at KIST: Applications to Fusion Materials

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The Accelerator Laboratory at the Korea Institute of Science and Technology (KIST) operates accelerator systems for ion beam analysis (IBA), accelerator mass spectrometry (AMS), and ion implantation. The facility consists of three accelerators with dedicated beamlines: a 6 MV tandem accelerator (IBA, AMS, and ion implantation), a 2 MV pelletron accelerator (IBA and ion implantation), and a 400 kV Cockcroft-Walton type accelerator (ion implantation). The IBA station employs Rutherford Backscattering Spectrometry (RBS), Elastic Recoil Detection (ERD), and Time-of-Flight ERD (ToF-ERD). The AMS line measures rare isotopes such as C-14, Be-10, Al-26, Cl-36, and I-129, with applications in geochronology and biomedical research. The ion implantation beamlines, using various ion sources, are utilised for studies in semiconductors, space materials, nuclear materials, and nuclear synthesis research.

One of the principal advantages of IBA is the quantitative detection of hydrogen and its isotopes. This is a key capability for nuclear fusion material analysis. The development of nuclear fusion reactors requires plasma-facing materials (PFMs) that can withstand extreme thermal loads and intense particle fluxes. Understanding plasma–wall interactions (PWI), i.e. fuel retention, erosion–deposition processes, and surface modification, is therefore essential for reactor design. IBA is a suitable technique to provide experimental evidence in these studies.

We have initiated the analysis of fusion materials, including the samples from the tungsten divertor of the KSTAR tokamak, exposed during the 2024 campaign, as well as tungsten-coated carbon specimens tested under controlled laboratory plasma conditions. This work is the first application of IBA to PWI studies in Korea, and it will support KSTAR operation and future fusion research.

## Paper submission Plan

No

## Best Presentation

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