MEIS-K120 using 100 keV He^+ and TOF analyzer

W.J. Min[1], W.S. Kim[1], K. Park[1], K.H. Jung[1], S.Y. An[1], J.-s. Kim[1], S.G. Kim[1], C.S. Sim[1], S. Kim[1], J. Kim[1], K.-S. Yu[1], M.A. Sortica[2], P.L. Grande[2] and D.W. Moon[3]

dwmoon@dgist.ac.kr

[1] *K-MAC, 33, Techno 8-ro, Yuseong-Gu, Daejeon 305-500, Rep. of Korea.*
[2] *Instituto de Física, Universidade Federal do Rio Grande do Sul, Avenida Bento Gonçalves 9500, 91501-970 Porto Alegre, Rio Grande do Sul, Brazil*
[3] *Department of New Biology, DGIST, Dalseong, Daegu, 711-873, Republic of Korea*

Time of Flight - Medium Energy Ion Scattering spectroscopy (TOF-MEIS) using 100 keV He^+ was commercialized at K-MAC, Republic of Korea. He^+ was created by the RF plasma ion source and accelerated to 100 keV. Then, the He^+ was focused on the sample to 30 μm ~ 1 mm by 3 einzel lens system. The continuous ion beam was chopped to 350 ps pulse beam to adopt TOF analyzer. TOF analyzer detects the scattered ion energy without loss of neutralized scattered ion. At the end of the TOF tube, the large delay line detector accepts the scattered ion with enhanced efficiency. The faraday cup was installed for monitoring the incident ion current in the middle of ion optics system. As a result, the experiment by controlling the accurate count of incident ions is possible to absolute quantification. The MEIS-K120 equipment is controlled by PC, and S/W was included the control, data acquisition, and simulation tool.

By using TOF-MEIS, we measured the elemental depth profile (including hydrogen) of various nano-scale ultra thin film such as 1, 3, 5, 7 nm HfO_2 / SiO_2 / Si, (1 nm HfO_2 / 5 nm SiO_2) × 5 / Si multilayer, arsenic ultra shallow junction in Silicon substrate, and strain profile of SiO_2 / Si interface. Even thick sample such as over 100 nm $InGaZnO_x$ was analyzed with a help of Ar^+ sputtering. In addition, the 3D compositional profiling of CdSe/ZnS quantum dot and FinFET was analyzed by using TOF-MEIS and POWERMEIS simulation.