

DEVELOPMENT OF GAS CLUSTER ION BEAM SOURCE FOR SIMS ANALYSIS

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Gas cluster ion beam (GCIB) has been making a new possibilities in analytical instruments. Especially, for secondary ion mass spectrometry (SIMS), the GCIB is a powerful technique [1] for the in-depth chemical structure analysis of organic materials [2,3]. Currently, cluster ion beam is widely used as a primary analyser gun for analysing organic and biological samples in secondary ion mass spectrometer. We developed our own Ar gas cluster ion beam source and column. Gas cluster is generated by precision nozzle. But it needs an extra parts (ionizer) to ionize neutral gas clusters. The ionizer structure have been simulated to know efficient control electrode and deliver high current extraction. Simulation show that the extraction electrode having a dependence of electrode and deliver high current extraction. Simulation has been performed by SIMION 8.1 code. The results from simulation show that the extraction electrode having a dependence of electron trajectory in ionization area. The voltage of extraction electrode directly control the path of electron. So, we assume that the resident time of electron is proportional to ionization probability of neutral gas. In this point of view, the extraction electrode can be an efficient ion beam control electrode. The extraction electrode were tested by varying their voltage. The voltage range was controlled within "0 ~ 1,000V". Experimental results well accord with simulation results. Generated ion beam current from the ionizer is higher than 200 nA. The precision nozzle, their chamber, and skimmer are constructed and integrated with the ionizer chamber.

KBSI gas cluster ion beam source has been developed with SIMION 8.1 code. This gas cluster ion beam well be focused on analysing organic material and bio samples. To do this, various ion beam source and cluster has been designed and developed.

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