Low Energy Electron Source for Low Temperature

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It is necessary to develop a new electron source for low energy, since the accumulation of electrons onto liquid He surface is considered to occur in the condition of low electron kinetic energy.
There are several way to make electron sources; one is thermal cathode (filament), another is electric field emission, and the other is photo cathode type. In the electron source we developed, we employed the thermal cathode type, because the construction is simpler than the photo cathode, and it is easier to get low electron energy compared to the field emission type electron sources.
We added some electrodes to the new electron source other than the filament itself. Important electrodes are "suppress" and "extract". These are rather common electrodes as usual electron sources, but sometimes ignored in the study of low temperature physics in order to make the experiment simpler. The suppress electrode controls the angle of electron emission, and results in the higher electron current onto the sample surface. The extract electrode gives us high electron flux by keeping the enough electric field at the filament to extract electrons.
We measured the energy resolution and electron flux of the new electron source. The energy resolution is about 0.6 eV FWHM. The electron current is enough at the kinetic energy of 1 eV.