Polarized electron beam from single pyramid-shape GaAs fabricated by anisotropic wet etching

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The spin-polarized electron sources (PES) have been developed for a future linear collider and a spin-LEEM by our group. Up to now, the high polarization and high quantum efficiency photocathodes with strained superlattice structure were developed. However, both improvements of negative electron affinity (NEA) lifetime and beam emittance are still required. From this view point, a pyramid-shape photocathode is interesting, because the conduction band electrons can be extracted into vacuum by using the field emission mechanism instead of NEA surface. It is also expected the high brightness beam can be emitted from minute territory at the top of pyramid. The spin polarized electron beam was already extracted using the field emitter arrays of this pyramid-shape GaAs. As a next step, a single pyramid-shape GaAs photocathode has been fabricated to study the field emission mechanism more precisely. A progress of experimental study on this photocathode will be reported at the workshop.

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