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## Development of new method of NEA Activation with Cs-Sb-O

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Negative Electron Affinity (NEA) activated GaAs photocathodes are the only one capable of generating spin-polarized electron beam larger than 90%. However, the NEA layer currently made from mainstream cesium (Cs) and oxygen (O) is chemically unstable, the NEA-GaAs photocathode has a rapid QE degradation over time or electron beam. As a result, it requires an operating vacuum pressure of  $1e-9$  Pa and has a short lifetime. Recently, a new NEA layer using heterojunctions with semiconductor thin film of alkali metals and antimony or tellurium has been proposed. The latest research shows that the NEA activation method using Cs-Sb-O is made by co-evaporation of Cs, O<sub>2</sub> and Sb. However, the co-evaporation method has high demands on equipment. Therefore, in this work, we attempted to fabricate a Cs-Sb-O NEA layer using a separation evaporation method. Specifically, we attempted four recipes and successfully fabricated the NEA layer by Cs-Sb-O. We also evaluated the dependence of QE on Sb thickness and found that it is easy to form a NEA layer with 0.2 nm of Sb.

### Footnotes

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