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Molecular beam epitaxial growth of Sodium Antimonide photocathodes

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Cornell University has been working on developing techniques to grow single crystal photocathodes for electron sources using the Molecular Beam Epitaxy (MBE) technique. As a result, the first single crystal Cs3Sb photocathode was produced, which has shown high quantum efficiency and is expected to have a low Mean Transverse Energy (MTE). Now, other alkali materials are being explored. In this work, we report the epitaxial growth of Na-Sb photocathodes at the PHOtocathode Epitaxy Beam Experiments (PHOEBE) laboratory at Cornell University, employing a sequence of shuttered growth steps to form distinct unit cells. The photocathodes were characterized by Quantum Efficiency (QE) measurements and Reflection High-Energy Electron Diffraction (RHEED) patterns collected during growth. The RHEED streaky pattern shows angle dependence, confirming their single crystal structure. Notably, these Na-Sb photocathodes exhibited a QE exceeding 1% at 400 nm, which is much higher than previous reports on this compound. The possible reasons for this discrepancy are discussed.

Footnotes

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LaTeX

Region represented

America

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