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Ultra Thin Cs_3Sb Photocathodes With Anomalously High Quantum Efficiency

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In this proceeding, we demonstrate the synthesis of epitaxial Cs_3Sb films with a high degree of crystallinity on silicon carbide substrates. Films less than 10 nm thin are grown in vacuum and exhibit percent level quantum efficiencies at 532 nm. We find a positive correlation between quantum efficiency and improved crystallinity of the photocathode film, particularly in the longer wavelengths of the visible spectrum. We present a model describing the optical interference effects observed in the SiC - Si substrate multilayer that enhance quantum efficiency of the thin film photocathodes by almost a factor of two at particular wavelengths. Additionally, we characterize the surface and bulk crystallinity of epitaxial Cs_3Sb films using both X-ray diffraction (XRD) and reflection high energy electron diffraction (RHEED) in an endeavor to identify relationships between crystalline phases and photocathode performance.

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