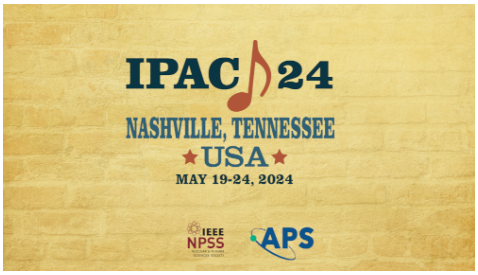

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Epitaxial growth of cesium potassium antimonide photocathode

Wednesday, 22 May 2024 16:00 (2 hours)

Photocathodes play an integral role in the development of electron accelerators and photon detectors. The emitted beam brightness can be limited by the surface and bulk disorder of the polycrystalline photocathode material. Epitaxial growth of photocathodes has the potential to overcome this problem and achieve high brightness electron beam. This work demonstrates the epitaxial growth of K2CsSb photocathode on varied single crystal substrates. In our study, streaky pattern aligned with latticed matched substrates from reflection high energy electron diffraction (RHEED) were observed from the K2CsSb thin film. Further, azimuthal angular dependence of the crystalline structure of the K2CsSb thin film was also observed for RHEED, which confirms the growth of the epitaxial layer with flat surface and high crystallinity. We obtained quantum efficiency (QE) of about 4.5 % at wavelength 530 nm light from the ˜ 20 nm film with a roughness of ˜ 0.8 nm. The stoichiometry and crystallinity of the K2CsSb thin films are confirmed by X-ray diffraction (XRD) and X-ray fluorescence (XRF). High QE over 9 % at 530 nm has been achieved for epitaxial K2CsSb photocathode thin films.

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