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Investigating Dirac semimetal cadmium arsenide as a potential low-MTE photocathode

Wednesday 13 August 2025 16:00 (2 hours)

We report on the quantum efficiency (QE) and mean transverse energy (MTE) of photoemitted electrons from cadmium arsenide (Cd₃As₂), a three-dimensional Dirac semimetal (3D DSM) of interest for photocathode applications due to its unique electronic band structure, characterized by a 3D linear dispersion relation at the Fermi energy. Samples were synthesized at the National Renewable Energy Laboratory (NREL) and transferred under ultra-high vacuum to Arizona State University (ASU) for measurement using a photoemission electron microscope (PEEM). The maximum QE was measured to be 3.37 times; 10⁻⁴ at 230 nm, and the minimum MTE was 55.8 meV at 250 nm. These findings represent the first reported QE and MTE measurements of Cd₃As₂ and are an important step in evaluating the viability of 3D DSMs as low-MTE photocathodes. Such photocathodes, constrained to lower MTEs by the electronic band structure, may prove effective in advancing beam brightness in next-generation instruments and techniques.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

Yes

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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