

Abstract Submitted
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Transmissive concentrator multijunction solar cells with 47% in-band efficiency for a hybrid photovoltaic-solar thermal system QI XU, YAPING JI, Tulane University, DIMITRI KRUT, JIM ERMER, Boeing-Spectrolab Inc., MATTHEW ESCARRA, Tulane University, TULANE UNIVERSITY TEAM, BOEING-SPECTROLAB INC. COLLABORATION — Transmissive concentrator multijunction (TCMJ) solar cells with over 47% in-band power conversion efficiency (PCE) have been demonstrated. The illuminated I-V test under concentrated 500-sun solar spectra have shown that the PCE of the TCMJ solar cells for in-band light (photon energy above the cell's lowest bandgap) can reach up to 47.6% (29.5% for the full solar spectrum). Temperature coefficients of several parameters (open circuit voltage, short circuit current, fill factor) have been derived under 1 sun and 500 suns, showing linear variations versus temperature change. Optical measurements indicate that the cells show 76.5% solar-weighted optical transmission for the out-of-band light (photon energy below the cell's lowest bandgap). This TCMJ solar cell exhibits promising spectrum splitting capability, which has potential for use in hybrid photovoltaic-solar thermal energy conversion systems.

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