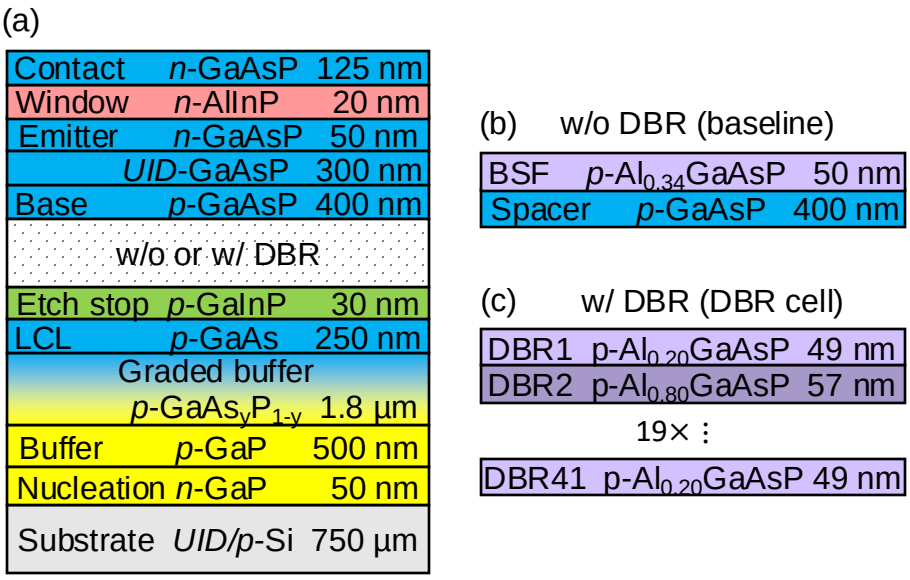

Fig. 1. Schematic of (a) GaAsP single-junction (1J) solar cells with either (b) a spacer and back surface field (BSF) layer or (c) an AlGaAsP distributed Bragg reflector (DBR) below the absorber to enhance photon absorption.

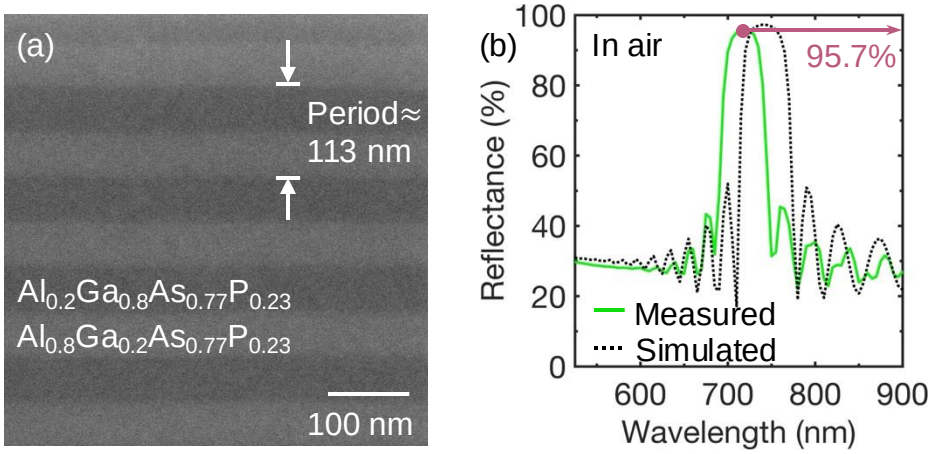

Fig. 2. (a) Cross-sectional SEM and (b) measured vs. simulated reflectance of an AlGaAsP DBR-only calibration growth. ~25nm shift in the central wavelength, due to interpolation errors in refractive index modeling, was corrected in the device growth.

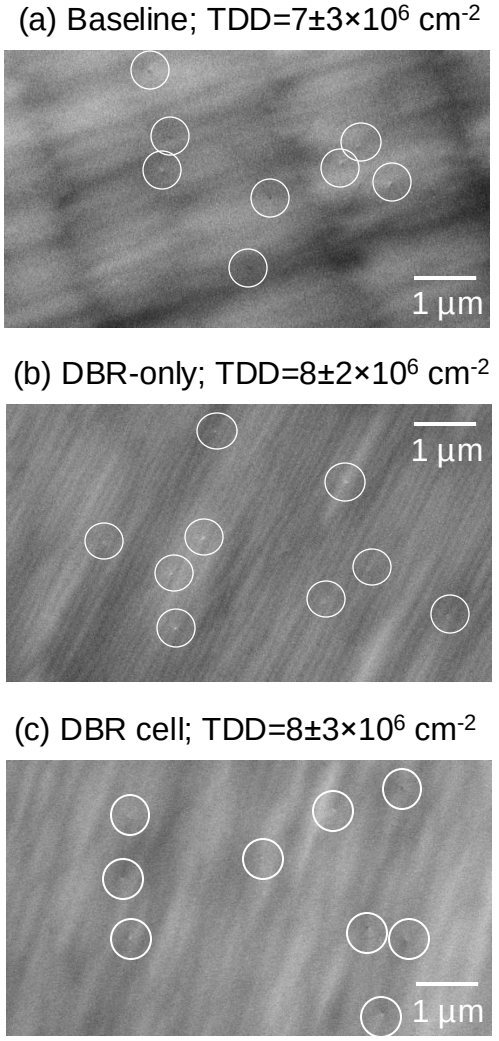

Fig. 3. ECCI micrographs of (a) GaAsP 1J baseline, (b) DBR-only calibration, and (c) GaAsP 1J DBR cell, with white circles denoting threading dislocations (TDs). All cells show similar TDD (≤8×10^7 cm^{-2}), confirming that the DBR does not introduce additional TDs.

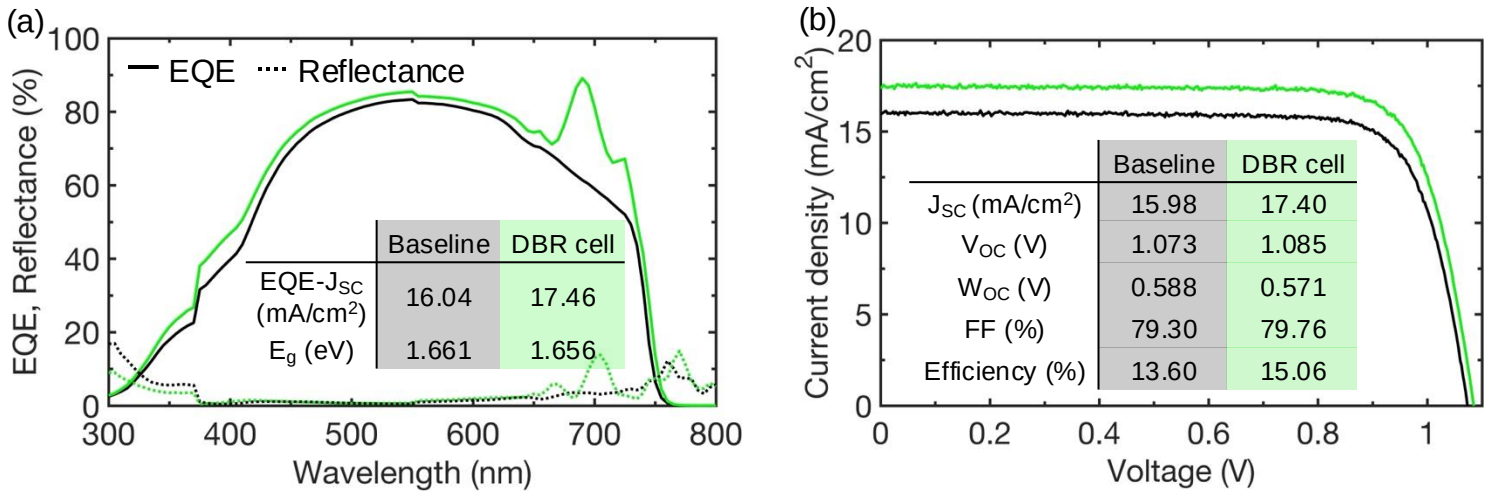

Fig. 4. (a) External quantum efficiency (EQE) and reflectance spectra, and (b) lighted current-voltage characteristics of GaAsP solar cells with and without an AlGaAsP DBR. The DBR significantly improves carrier collection at long wavelengths, increasing EQE-J_{SC} by 1.42 mA/cm^2. Increased J_{SC}, along with a 12 mV V_{OC} gain, drives a 1.46% absolute efficiency increase compared to the baseline cell.