The inset tells us quantitatively that considerable current enhancement is possible by employing a thinner CdS window, and to a lesser extent with a different glass or improved SnO_2 process. Potential for improvement in J_{SC} with an antireflection coating or from better collection of the deeply penetrating photons would be even smaller. It is certainly possible, however, to reduce the larger losses. The record efficiency cell, for example, has a J_{SC} of 26 mA/cm^2. Its losses from glass, SnO_2, and CdS absorption are each more than a factor of five less than the cell shown in Figure 14.23, and no single loss factor contributes more than 1 mA/cm^2.

The capacitance of a solar cell can yield information about extraneous states within the band gap, and it can often give a credible profile of the carrier density within the absorber [176]. Figure 14.25(a) shows the measured capacitance of a CdTe cell as a function of frequency for three biases: 0, −1, and −3 V. The capacitance magnitude is relatively small, corresponding to a small carrier density and a large depletion width. The large depletion width implies that most photons are absorbed in a region with an electric field and hence photocurrent does not vary significantly with voltage [177]. The fact that the curves are relatively flat over nearly three decades in frequency strongly suggests that they are not significantly affected by extraneous states. The upturn at high frequencies is

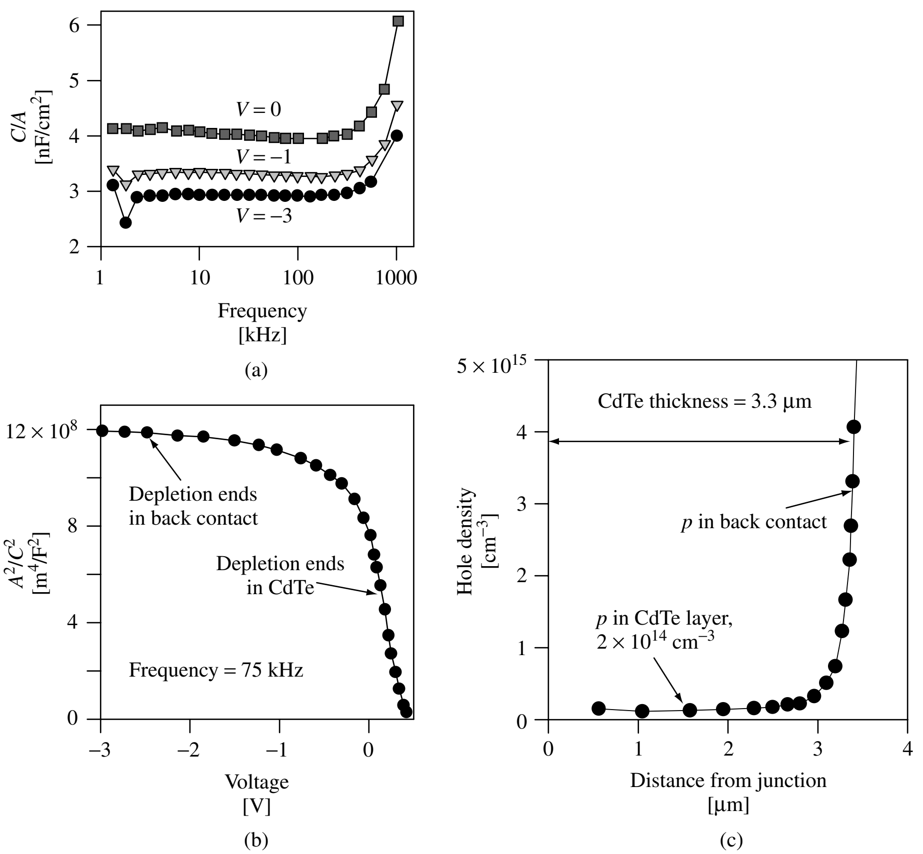

Figure 14.25 Capacitance measurements and hole-density determination for a CdTe solar cell