CdS. The latter enables high-efficiency devices to be processed despite exposure of the $Cu(InGa)Se_2$ to air prior to junction formation.

High-efficiency $CuInSe_2$-based solar cells have been fabricated by at least 10 groups around the world. While these groups employ a variety of processing technologies, all the solar cells have the same basic cell structure built around a $Cu(InGa)Se_2$/CdS junction in a substrate configuration with a Mo back contact. Figure 13.1 shows a cross-sectional schematic of a standard device. This structure utilizes a soda lime glass substrate, coated with a sputtered Mo layer as a back contact. After $Cu(InGa)Se_2$ deposition, the junction is formed by chemical bath–deposited CdS with thickness $\leq$50 nm. Then a high-resistance (HR) ZnO layer and a doped high-conductivity ZnO layer are deposited, usually by sputtering or chemical vapor deposition. Either a current-collecting grid or monolithic series interconnection completes the device or module, respectively. A TEM micrograph of the same structure, shown in Figure 13.2, clearly demonstrates the polycrystalline nature of these materials and the conformal coverage of the CdS layer.

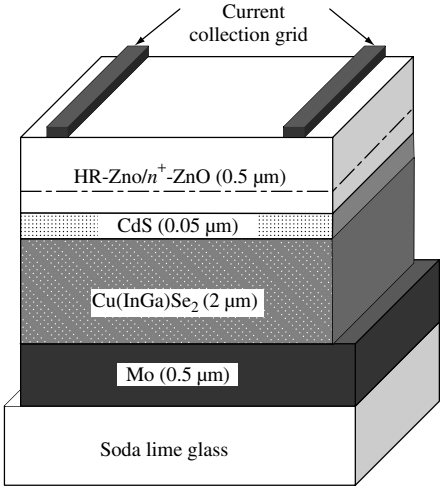

Figure 13.1 Schematic cross section of a typical $Cu(InGa)Se_2$ solar cell

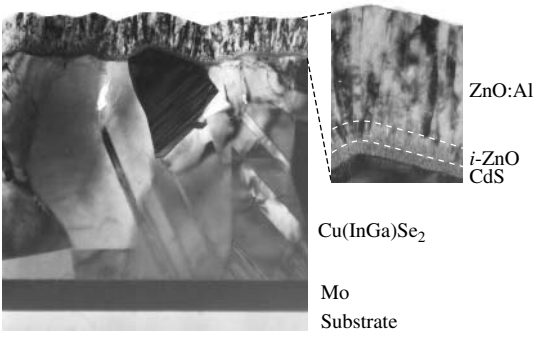

Figure 13.2 TEM cross section of a $Cu(InGa)Se_2$ solar cell