cell responds to and then to reduce the forward-bias voltage from the measured V_{OC} toward 0 V until the AC signal is a maximum.

3. Shine the monochromatic light on only one cell.
4. By using a mask, reduce the bias light on the cell in step 3 in regions where there is no bias light. This procedure ensures that this cell is current limiting (see Figure 16.10).
5. Finally measure the $S(\lambda)$ of the chosen cell in the module.

If the cells $S(\lambda)$ in the module are not a function of bias light intensity, then the region where the monochromatic light illuminates the cell does not need to be illuminated by a DC bias light. To measure each junction in a multijunction module, the spectral content of the bias light must be adjusted and the voltage bias and intensity of the bias light must be iterated. These procedures have been shown to produce the same relative spectral responsivity for an electrically isolated cell in a module as when all of the cells in the module were series-connected [147].

16.4.2 Grating-based Systems

The grating system shown in Figure 16.11 was developed to measure the responsivity of cells from 400 to 3200 nm. Grating-monochrometer-based systems are especially useful for their broad-wavelength range and high spectral resolution. If a double-grating monochrometer is used, then the stray light in the UV can be eliminated, which is important for UV or high-bias-light measurements [77, 151]. Long wave pass order-sorting filters are commonly used to suppress modes (e.g. $\frac{1}{2}\lambda$) due to shorter wavelengths. For example, a Schott WG360 color glass filter is commonly used for $S(\lambda)$ measurements in the 400- to 700-nm region and a Schott RG630 filter is used as an order-sorting filter for measurements over a 700- to 1150-nm wavelength range. If a single-grating monochrometer is used with a tungsten light source, a band-pass filter may be needed for measurements

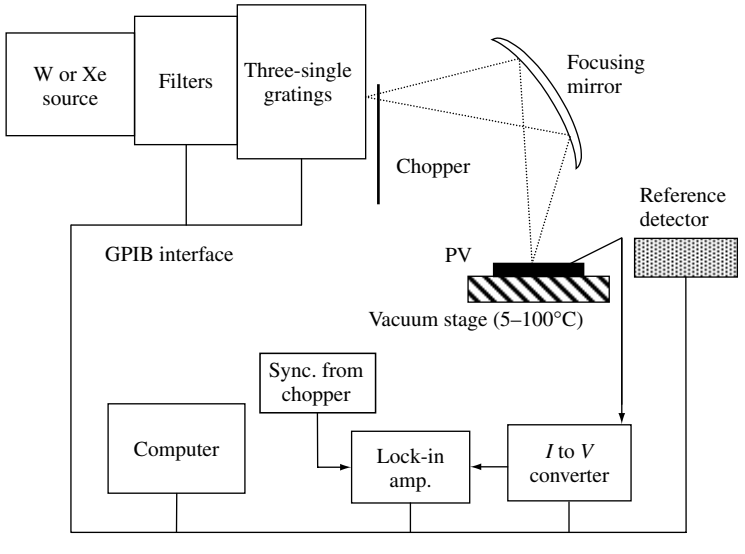

Figure 16.11 Typical grating-monochrometer-based spectral responsivity measurement system