

7.2. DETECTORS FOR ELECTRONS

The main advantages of semiconductor over scintillation detection systems are their robustness, cheapness, and compactness. The latter is particularly valuable for certain applications in that it allows the detector to be sited very close to the specimen even when space is very confined. This occurs, for example, when the specimen is immersed in a magnetic lens and channelling patterns from back-scattered electrons are to be recorded. A further advantage arises if images are to be formed in scanning microscopes using signals from a number of closely positioned detectors whose shapes may be quite complex. Using lithographic techniques, several detectors may be fabricated on a single silicon substrate and, provided the gains of any succeeding amplifiers are well

matched, a detection system with a well defined response function results.

7.2.5. Conclusions

A wide variety of different means exists for detecting electrons. Many are almost perfect in that they add very little noise to that already present in the electron beam. However, no single detector meets all the requirements of different experiments and, before selecting a detector for a specific purpose, it is necessary to consider the relative importance of the attributes listed in Section 7.2.2. Once this is established, it should be straightforward to determine the optimum detector for the task in hand.