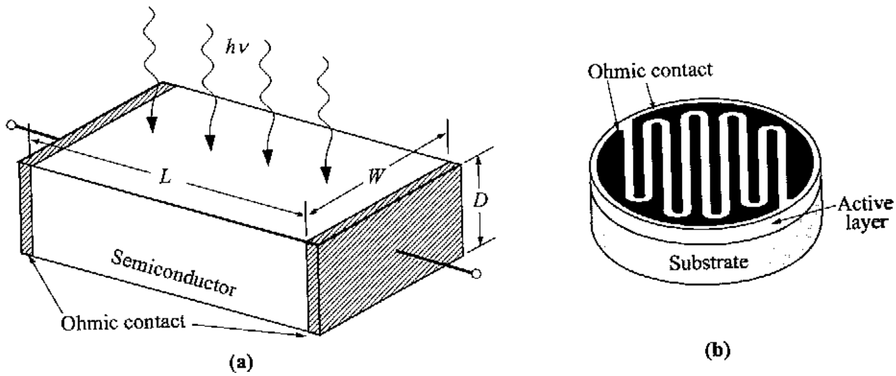

Fig. 2 (a) Schematic diagram of a photoconductor for analysis, which consists of a slab of semiconductor with two ohmic contacts. (b) Typical layout consists of interdigitated contacts with small gap.

The performance of a photodetector in general and a photoconductor in particular is measured in terms of three parameters: the quantum efficiency and gain, the response time, and the sensitivity (detectivity). First consider the principle of operation of a photoconductor under illumination (Fig. 2). Assuming a steady flow of photon flux impinging uniformly on the surface of a photoconductor with area $A = WL$, the total number of photons arriving at the surface is $(P_{opt}/h\nu)$ per unit time, where P_{opt} is the incident optical power and $h\nu$ is the photon energy. At steady state, the carrier generation rate G_e must be equal to the recombination rate. If the device thickness D is much larger than the light penetration depth $(1/\alpha)$ so that all light power is absorbed, the total steady-state generation and recombination rates of carriers per unit volume are

$$G_e = \frac{n}{\tau} = \frac{\eta(P_{opt}/h\nu)}{WLD} \tag{5}$$

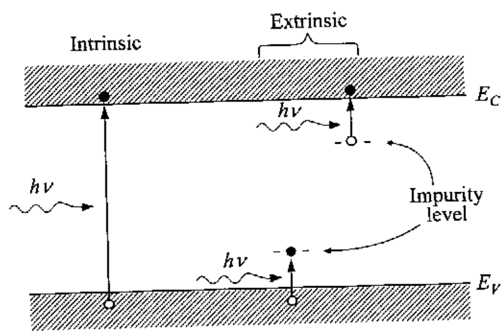

Fig. 3 Processes of intrinsic photoexcitation from band to band, and extrinsic photoexcitation between impurity level and band.