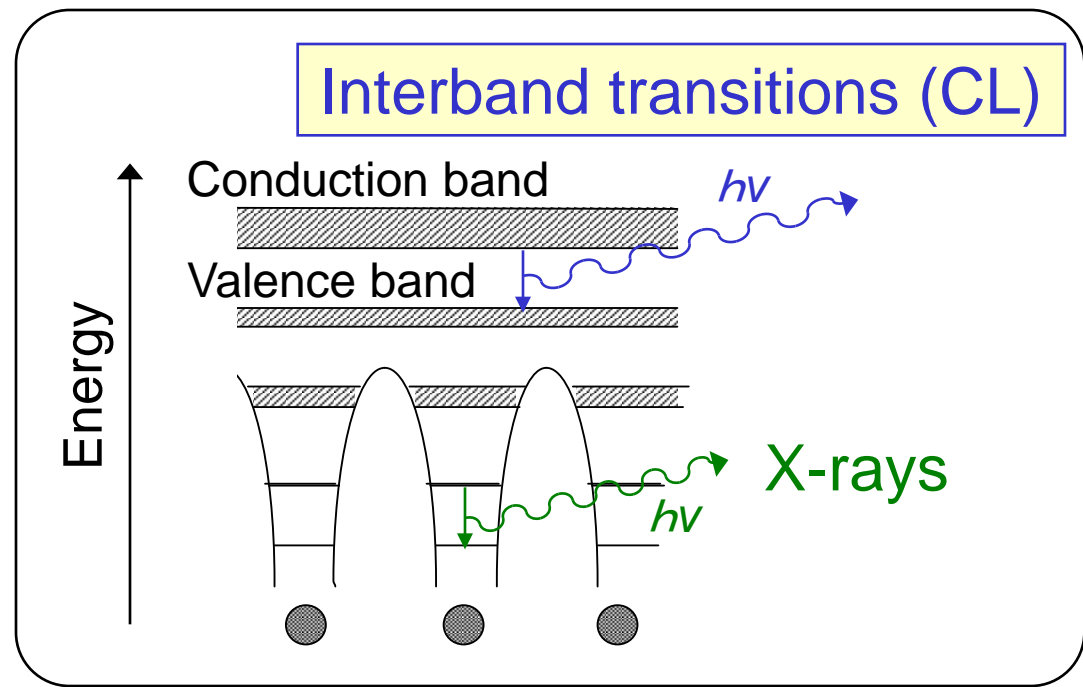
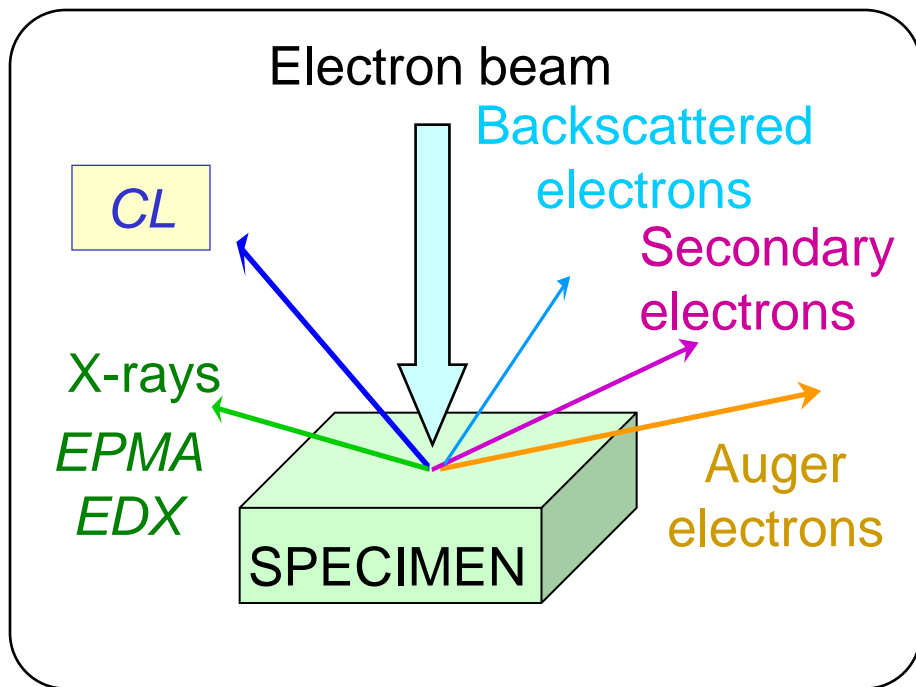
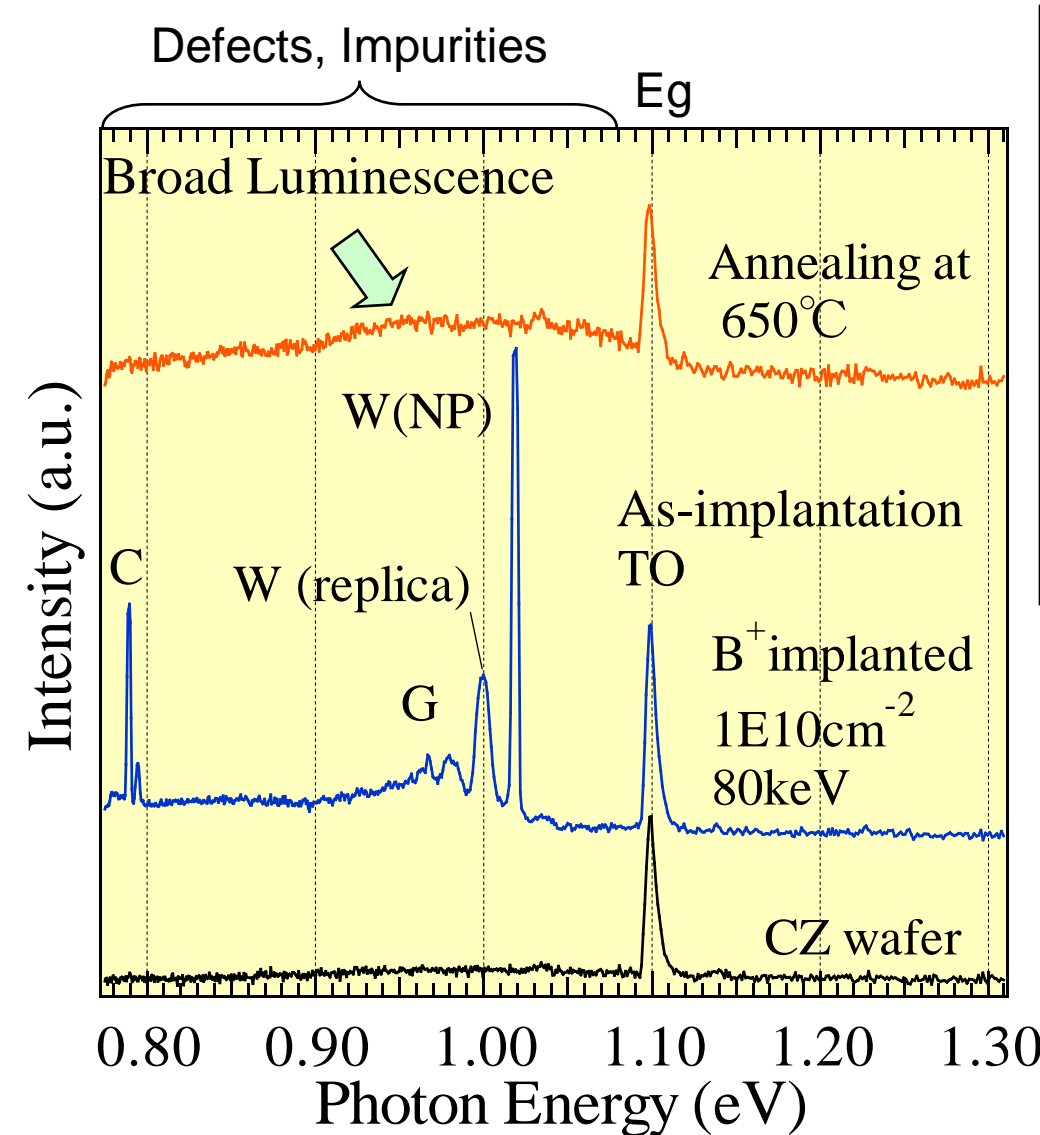


# Principle of Cathodoluminescence (CL)

- (1) Generation of electron-hole pairs by primary electron beam
- ⇒ (2) Diffusion of carriers
- ⇒ (3) Recombination of electron-hole pairs



# Characterization of defects generated by ion-implantation



- W, G, and C lines appear after implantation.
- These lines disappear after 650 °C anneal. However, broad luminescence remains. Crystallinity does not recovered.
- High temperature treatment are needed to eliminate defects completely.

TO: Band-edge emission followed by TO phonon emission  
 W: Silicon self-interstitial cluster Si<sub>i</sub>  
 C: Interstitial carbon–oxygen complex C<sub>i</sub>O<sub>i</sub>  
 G: Substitutional C and interstitial Si complex C<sub>s</sub>-Si<sub>i</sub>-C<sub>s</sub>