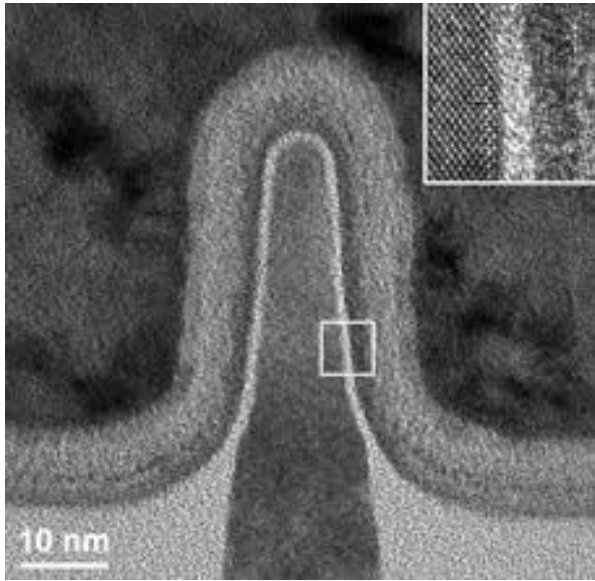
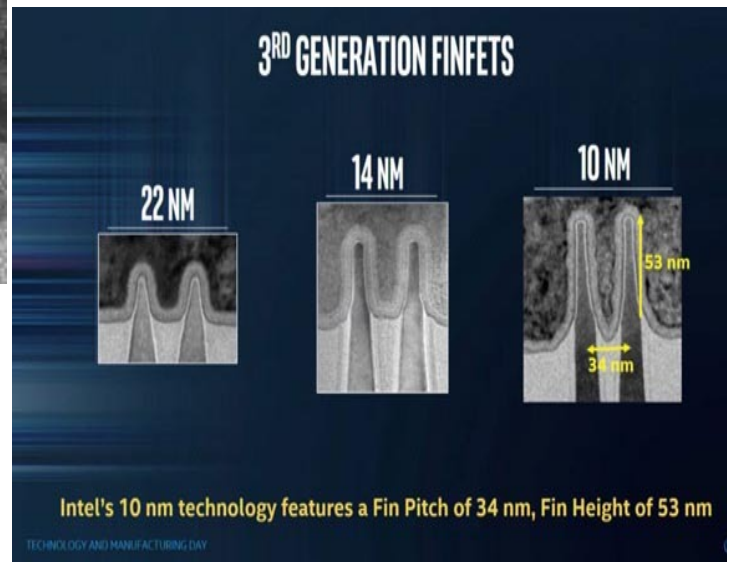


DIMENSIONI DEI DISPOSITIVI ATTUALI

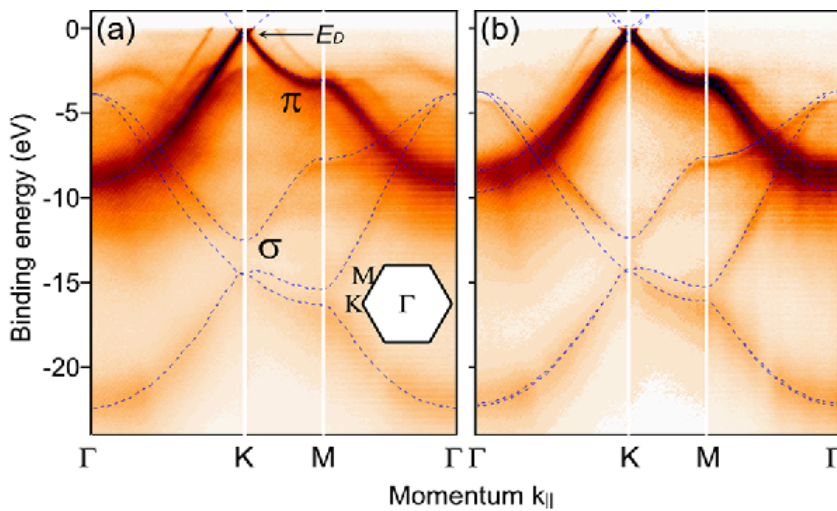
Sezione di un transistor FinFET, struttura su scala nanometrica usata nell'elettronica di punta (immagine ottenuta con un TEM)



Dimensioni tipiche di transistor in fabbricazione o in uso (immagine TEM)



STRUTTURA A BANDE



Esempio di struttura a bande, come si vede sperimentalmente mediante fotoemissione risolta in angolo. Il materiale è grafene. Le linee tratteggiate sono le previsioni teoriche

STRUTTURE SU SCALA NANOMETRICA IN USO DOVE SI SFRUTTANO EFFETTI DI CONFINAMENTO QUANTISTICO

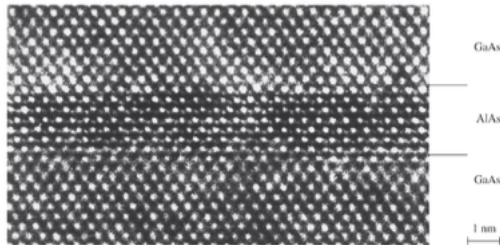
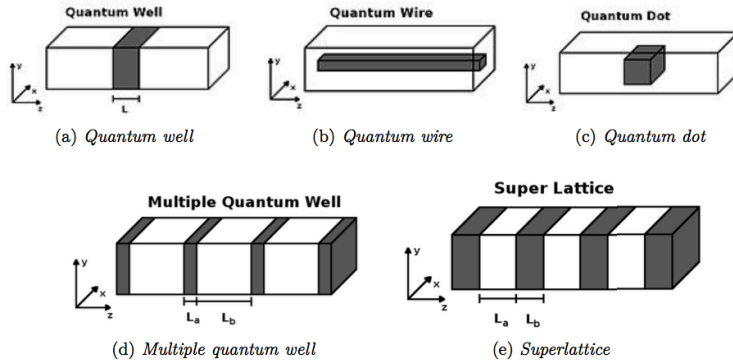


Immagine TEM di sezione di un quantum well

GaAs, $\text{Al}_x\text{Ga}_{1-x}\text{As}$, STRUTTURA A BANDE

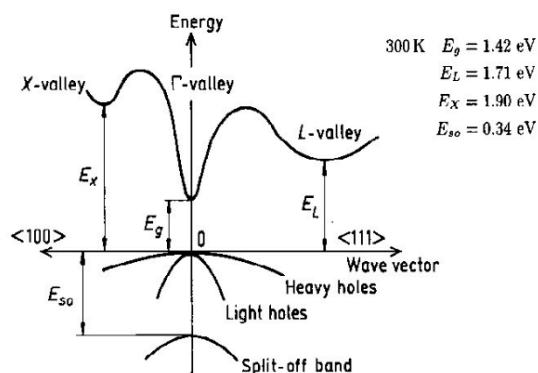
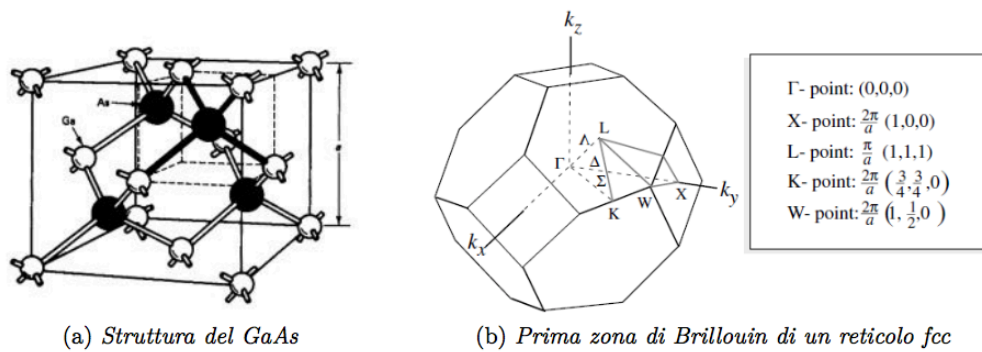


Figura 2.4: Struttura a bande del GaAs

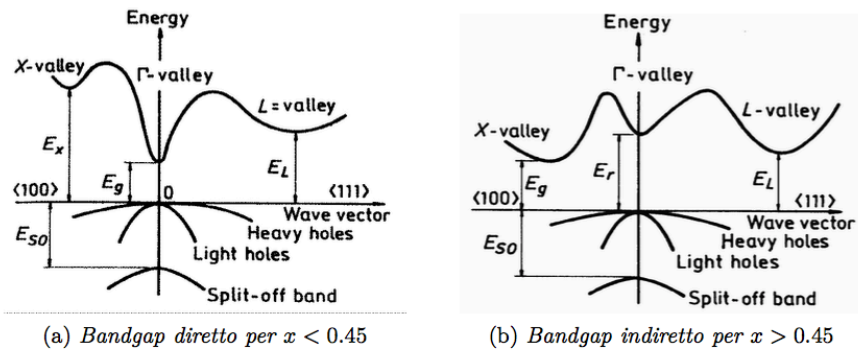
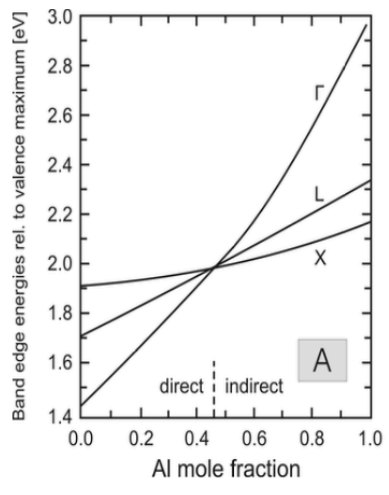
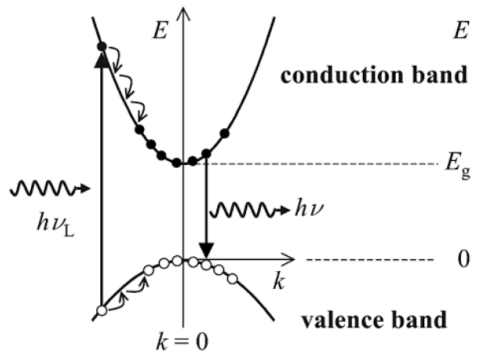


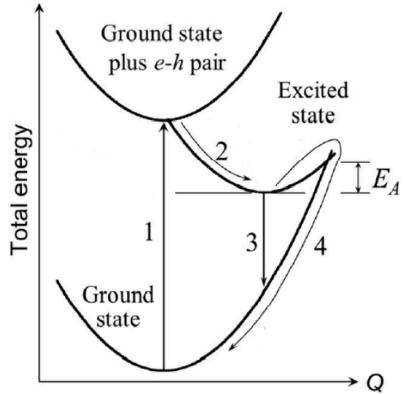
Figura 2.6: Struttura a bande di $Al_xGa_{1-x}As$



Dipendenza del gap energetico dell' $Al_xGa_{1-x}As$ dalla frazione x



Rappresentazione schematica del processo di fotoluminescenza



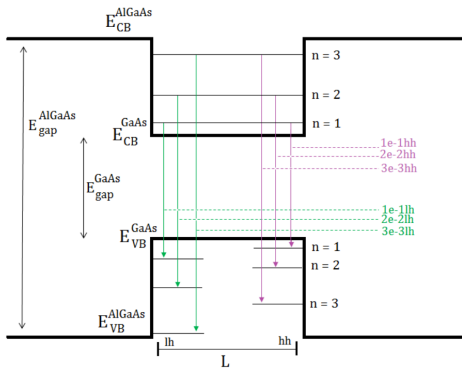
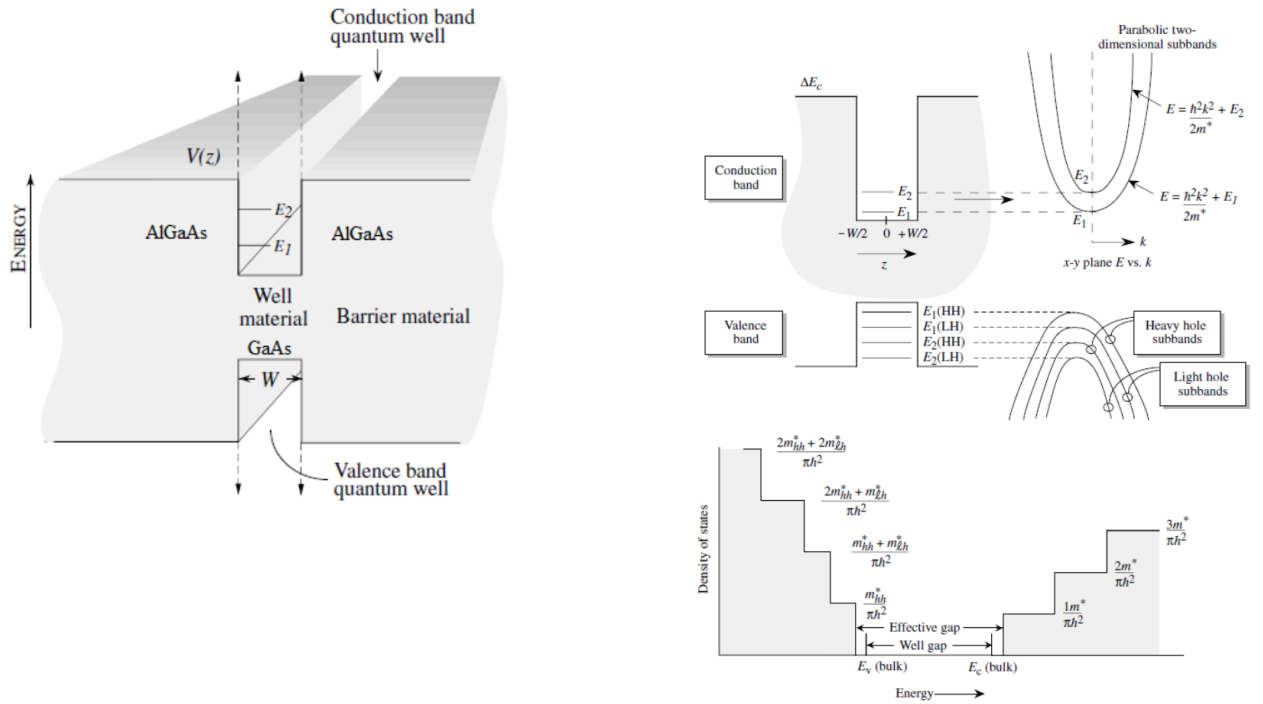


Figura 1.8: Le energie delle transizioni sono rappresentate dalle frecce, in viola quelle elettrone-lacuna pesante, in verde quelle elettrone-lacuna leggera.

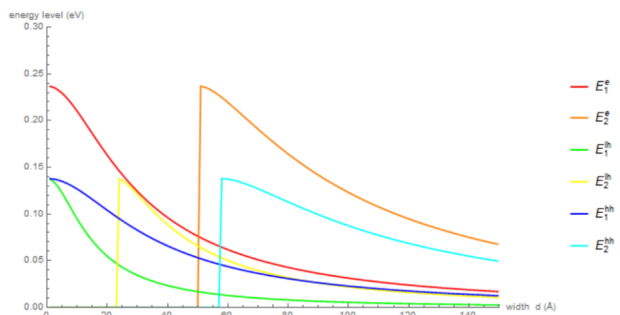


Figura 2.10: Andamento dei livelli energetici in una buca di potenziale rettangolare in funzione della sua ampiezza.

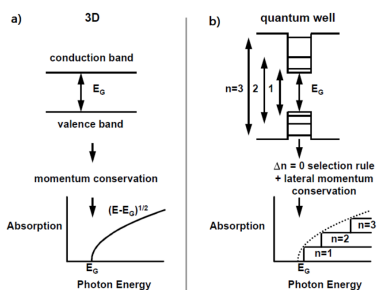


Figura 2.12: Assorbimento ottico in un semiconduttore di *bulk* in 3D (a) e in un *quantum well* (b) in assenza di effetti eccitonici.

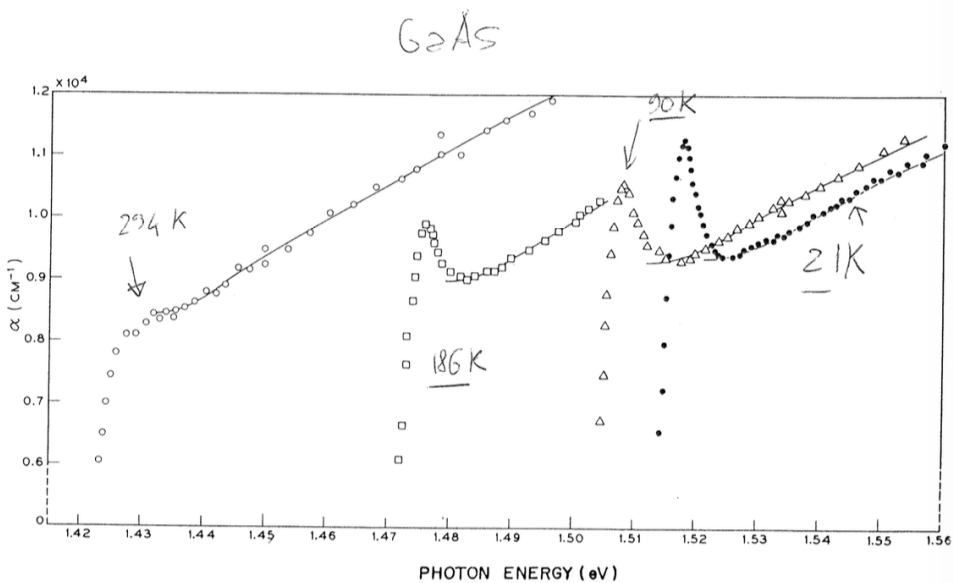
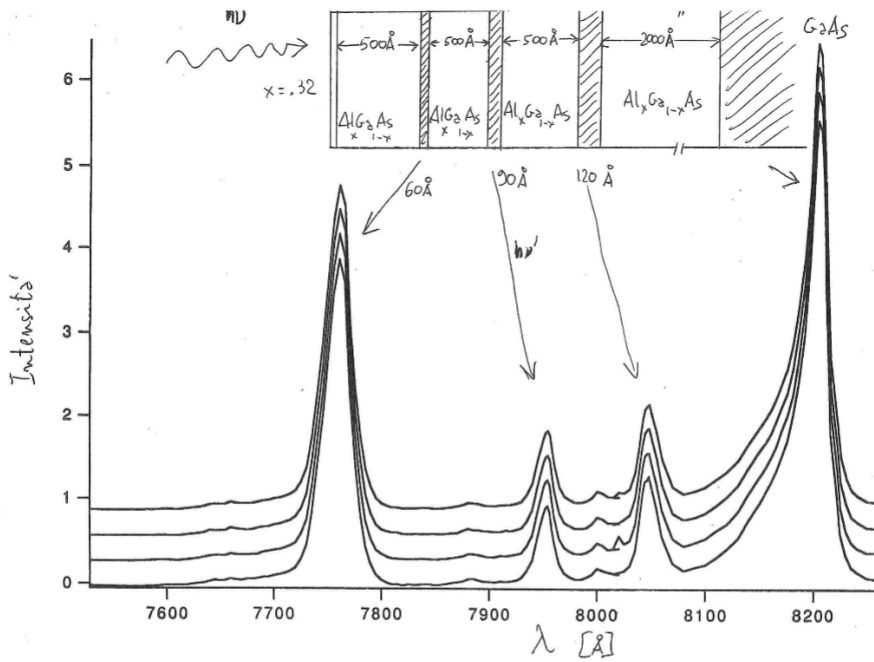


Fig. 3-24 Exciton absorption in GaAs; \circ 294°K, \square 186°K, \triangle 90°K, \bullet 21°K.¹²

¹²M. D. Sturge, *Phys. Rev.* 127, 768, (1962).

Coefficiente di assorbimento del GaAs a varie temperature



Spettro di fotoluminescenza a bassa temperatura di un campione con 3 pozzi quantici e un substrato.

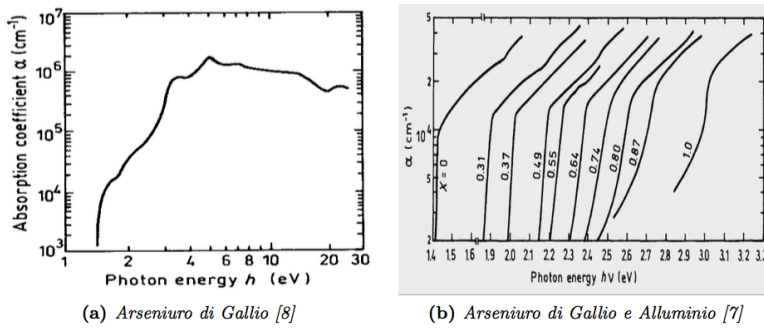


Figura 1.6: Dipendenza del coefficiente di assorbimento del GaAs e dell'AlGaAs dall'energia della radiazione incidente. Per quanto riguarda l' $Al_xGa_{1-x}As$, curve differenti corrispondono a diverse percentuali x di Al; in particolare, $x_1 \approx 0.1$, $x_2 \approx 0.42$ e $x_3 \approx 0.8$.

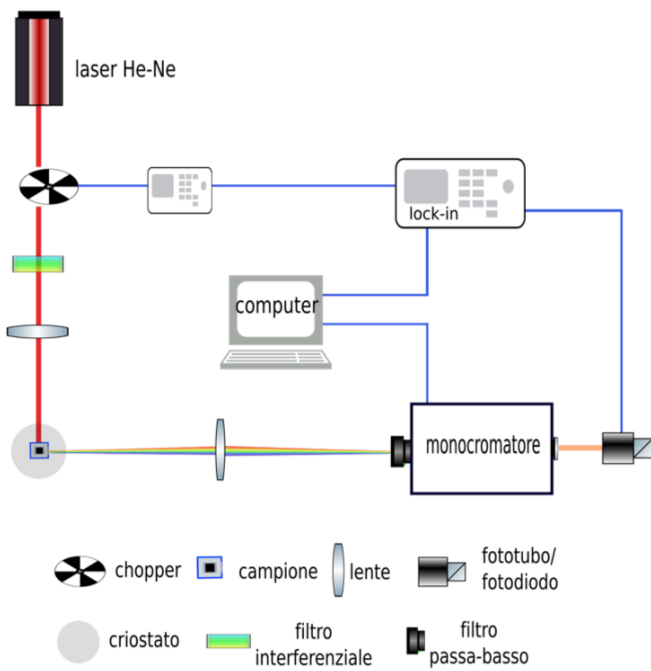
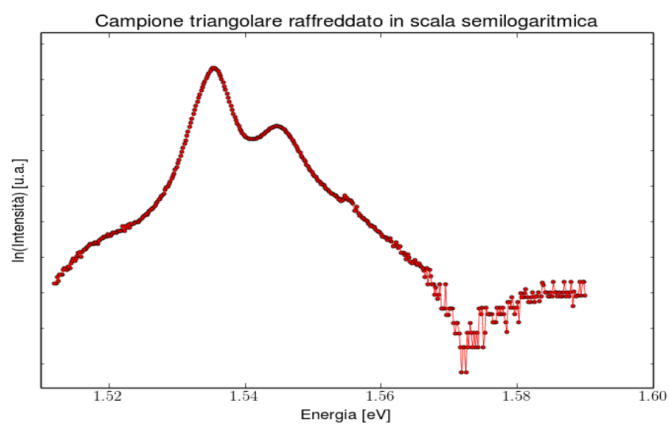
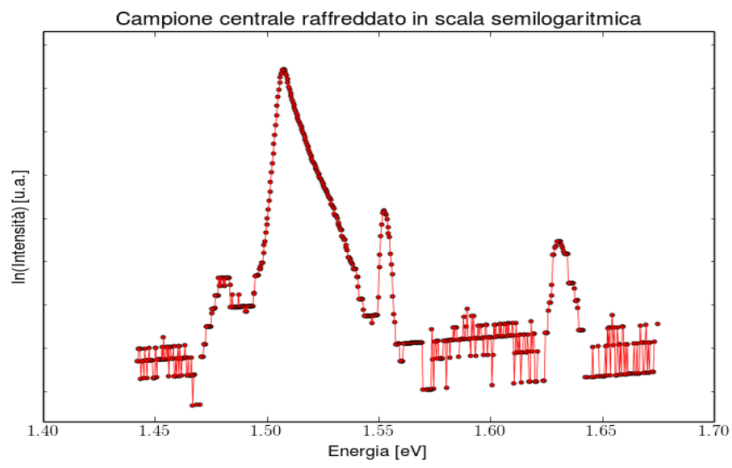
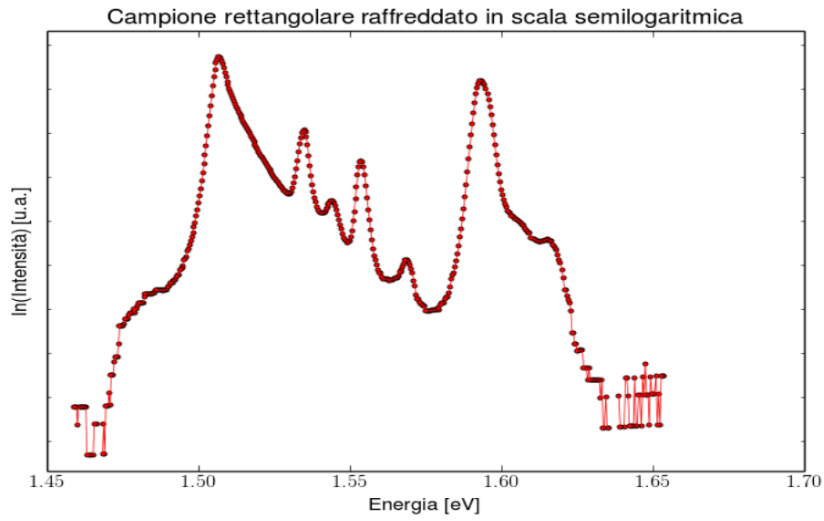


Figura 3.1: Schema dell'apparato sperimentale





$$\Delta E_c = 0.79x \text{ eV}$$

$$\Delta E_v = -0.46x \text{ eV}$$

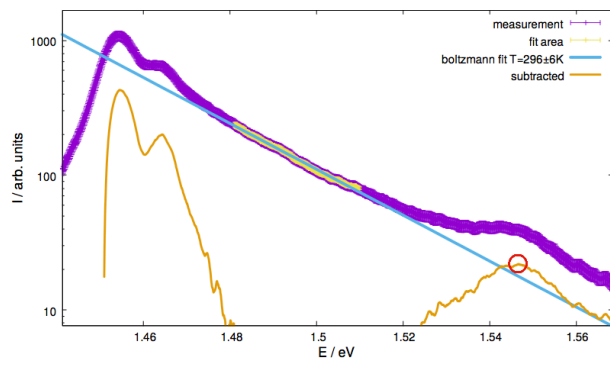
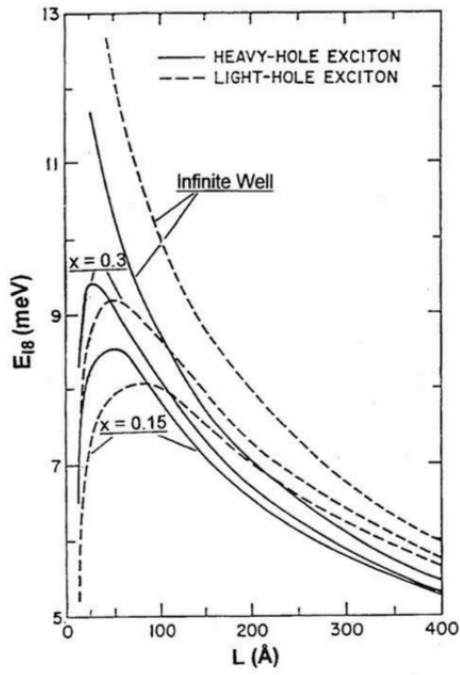


Figure 4.4: Sample A717 at high temperature.

