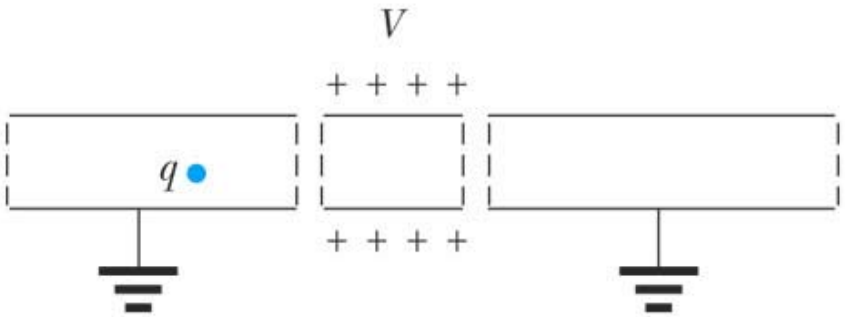
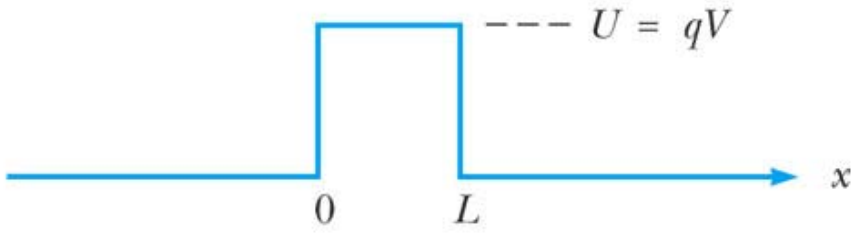
Tunneling



(a)



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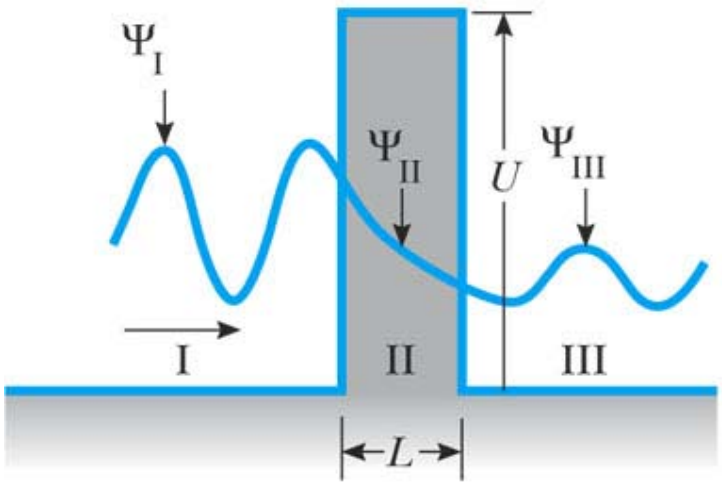
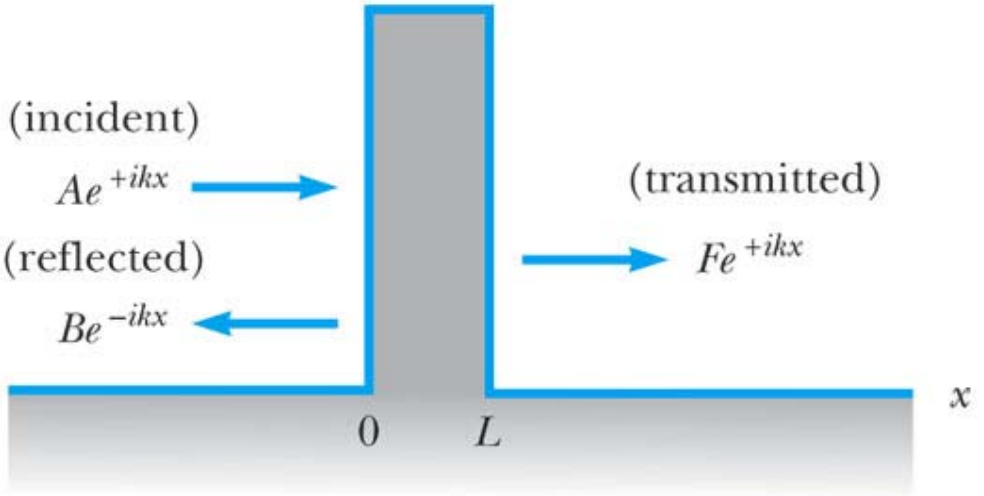


(a)



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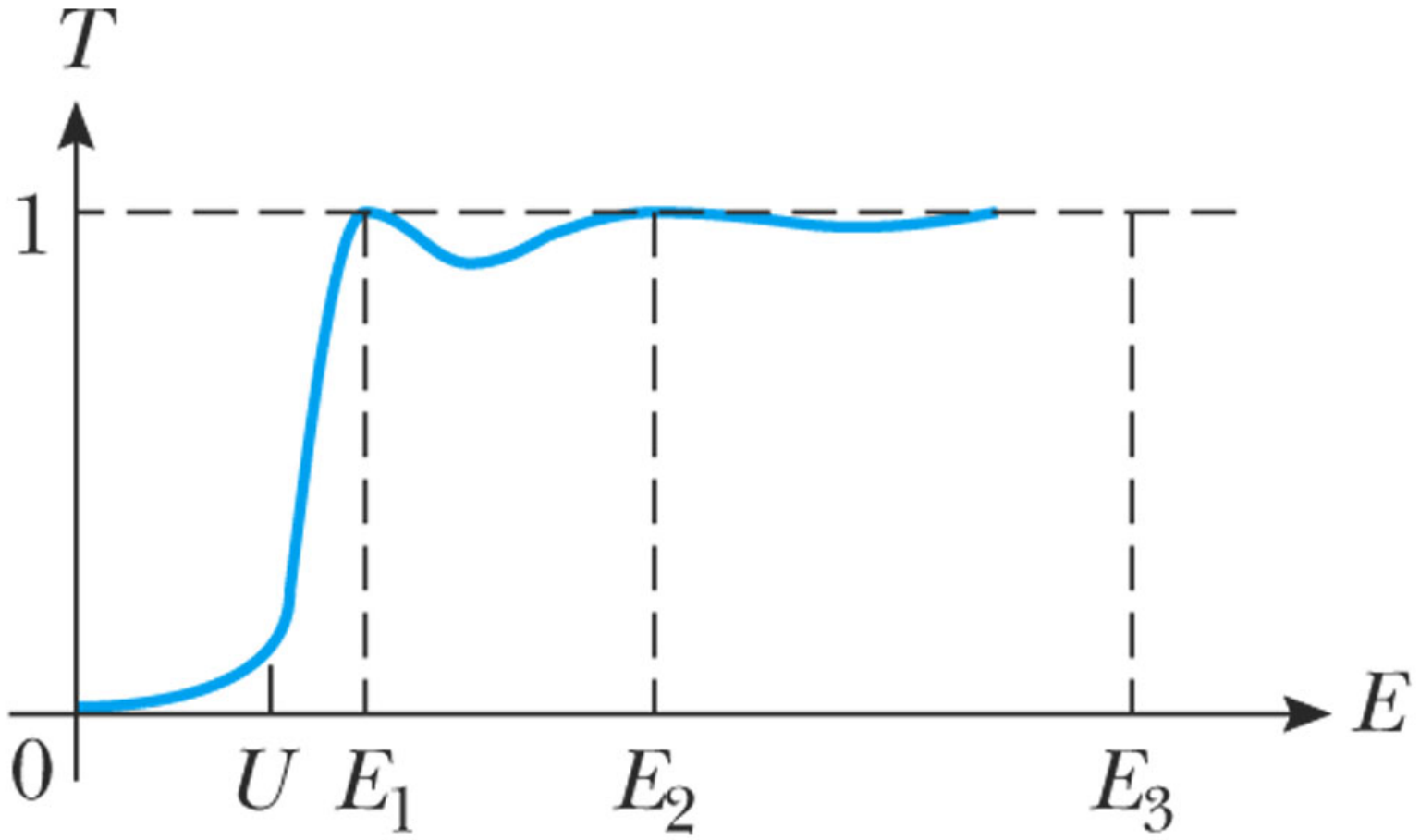
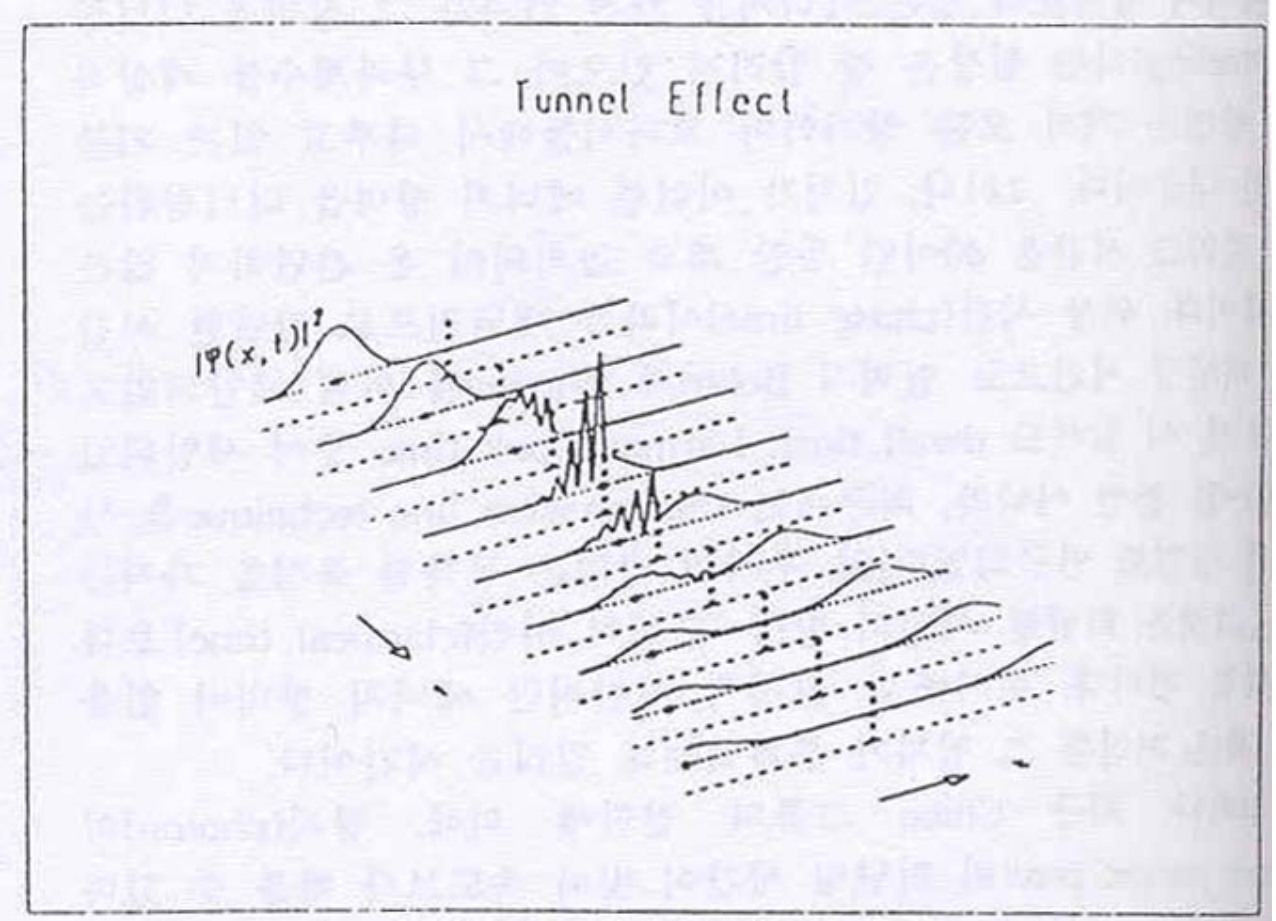
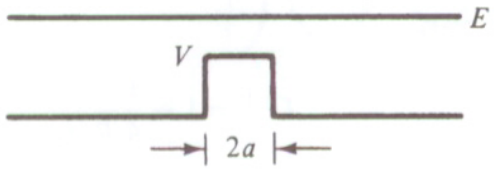
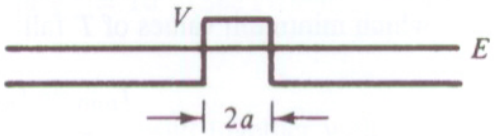
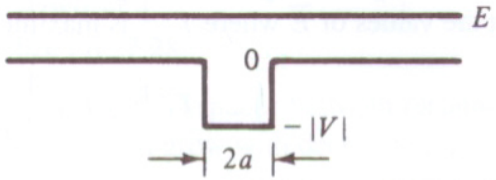


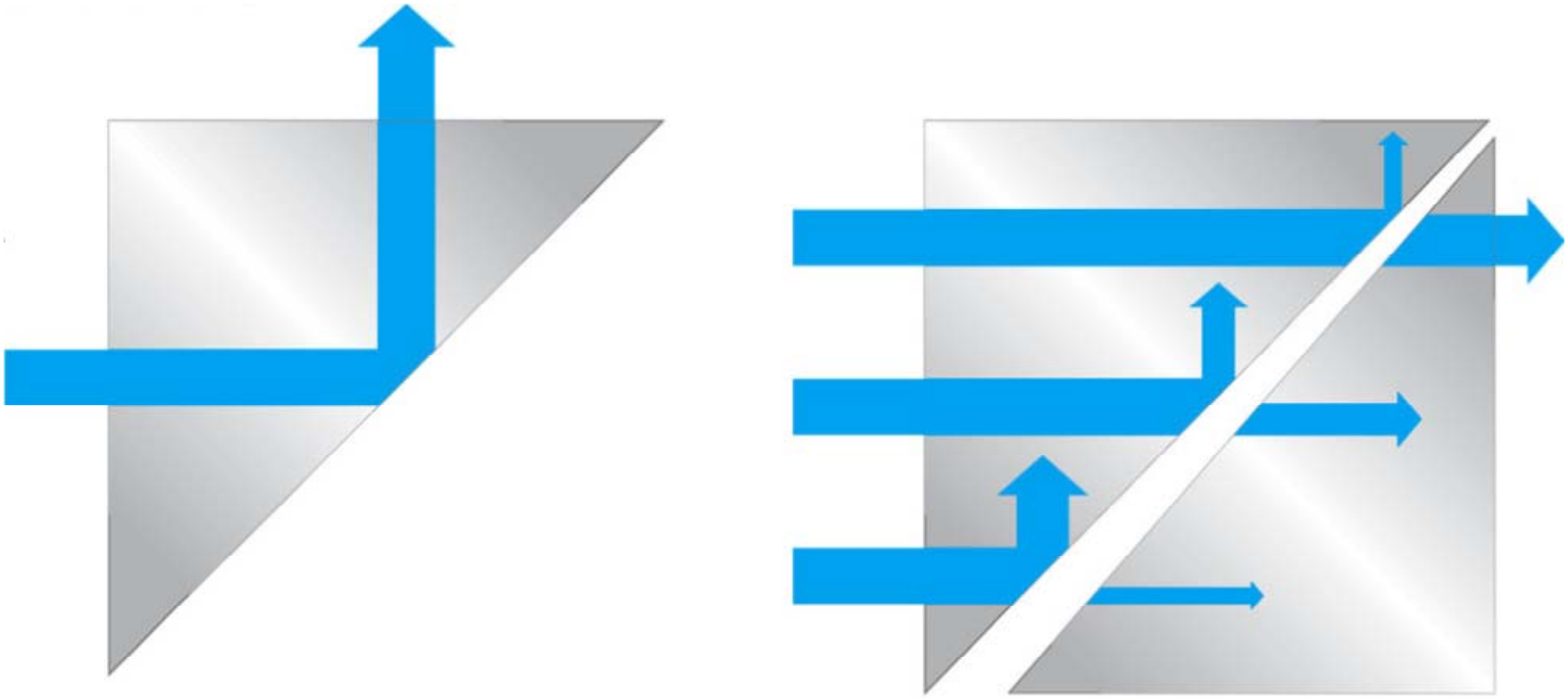


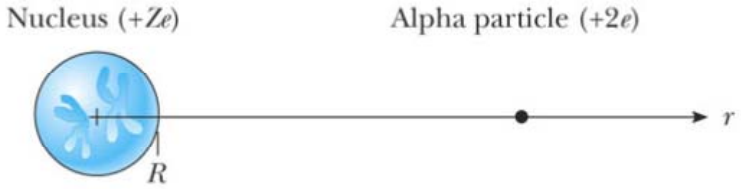
[그림 3] 전자가 하나의 전위장벽을 통과하는 시뮬레이션

TABLE 7.2 Transmission coefficients for three elementary potential barriers

	$T = \dfrac{4k_2/k_1}{[1 + (k_2/k_1)]^2}$ $\left(\dfrac{k_2}{k_1}\right)^2 = 1 - \dfrac{V}{E}$
	$T = 0, \quad R = 1$
	$\dfrac{1}{T} = 1 + \dfrac{1}{4}\dfrac{V^2}{E(E-V)}\sin^2(2k_2a)$ $\dfrac{\hbar^2 k_2{}^2}{2m} = E - V$
	$\dfrac{1}{T} = 1 + \dfrac{1}{4}\dfrac{V^2}{E(V-E)}\sinh^2(2\kappa a)$ $\dfrac{\hbar^2 \kappa^2}{2m} = V - E$
	$\dfrac{1}{T} = 1 + \dfrac{1}{4}\dfrac{V^2}{E(E+\lvert V\rvert)}\sin^2(2k_2a)$ $\dfrac{\hbar^2 k_2{}^2}{2m} = E - V = E + \lvert V\rvert$

Photon Tunneling





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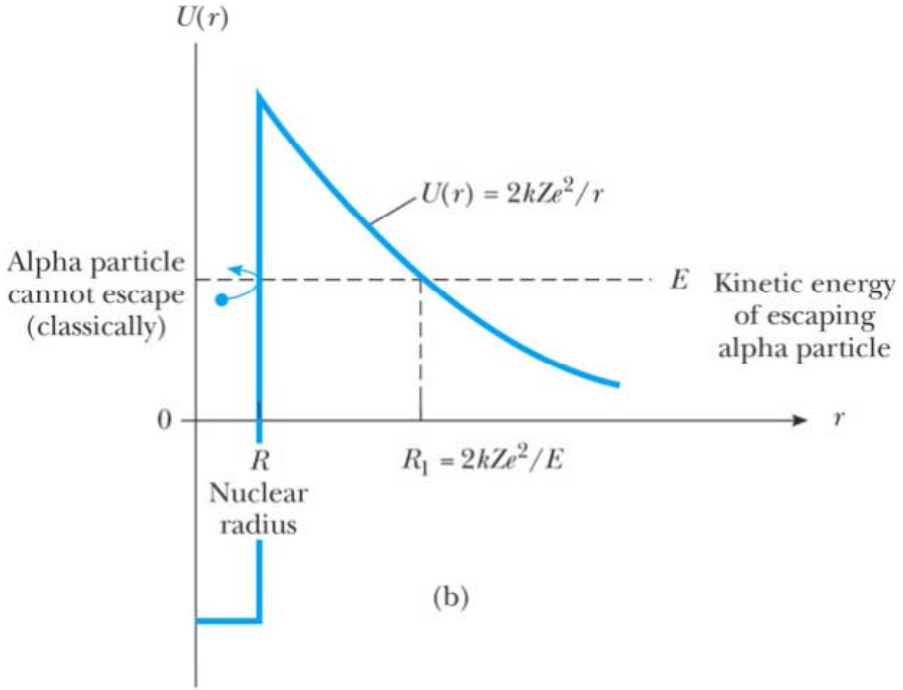

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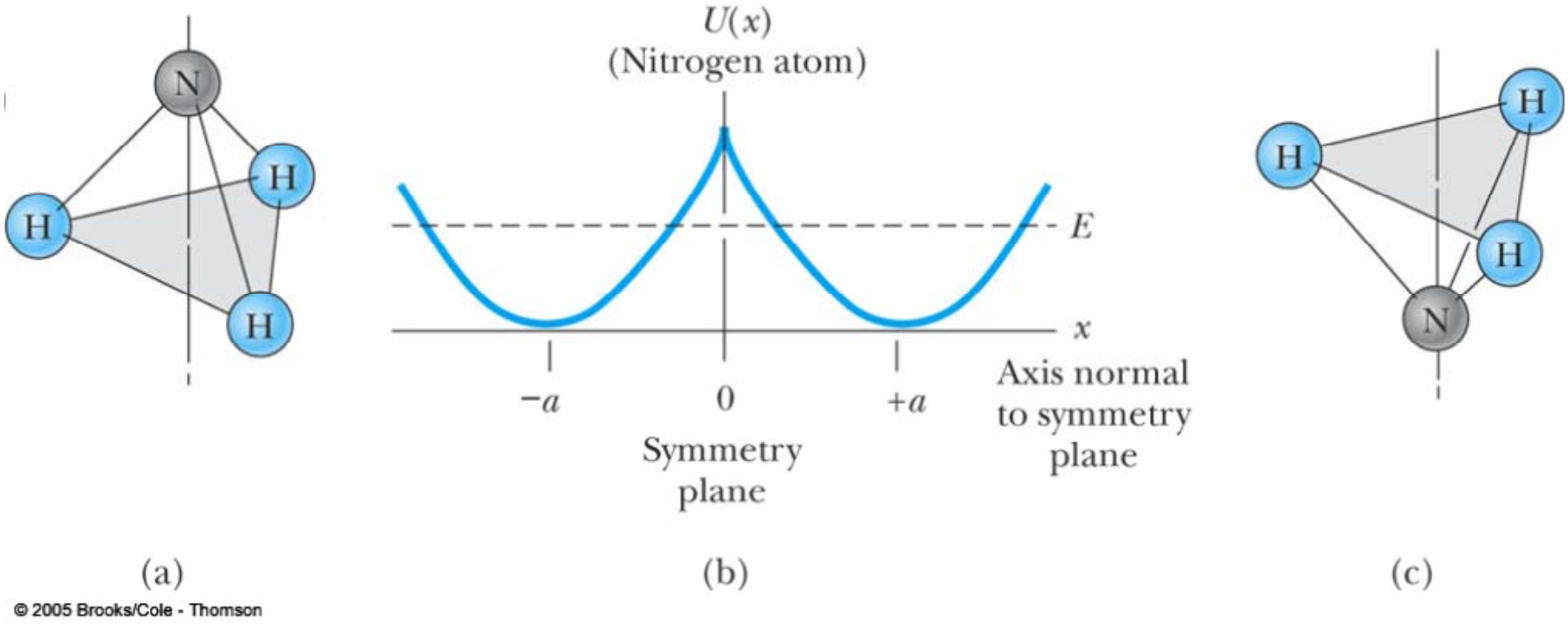
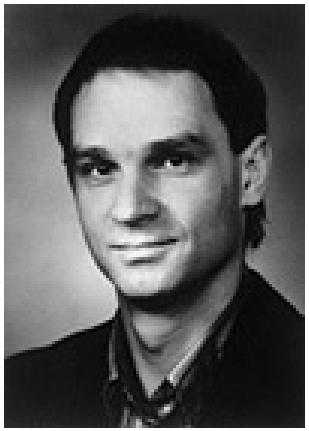
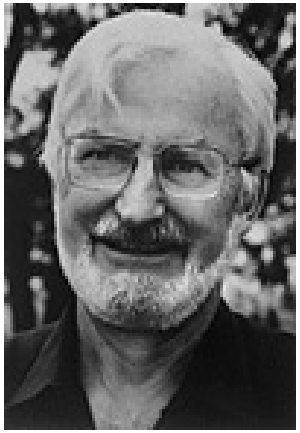


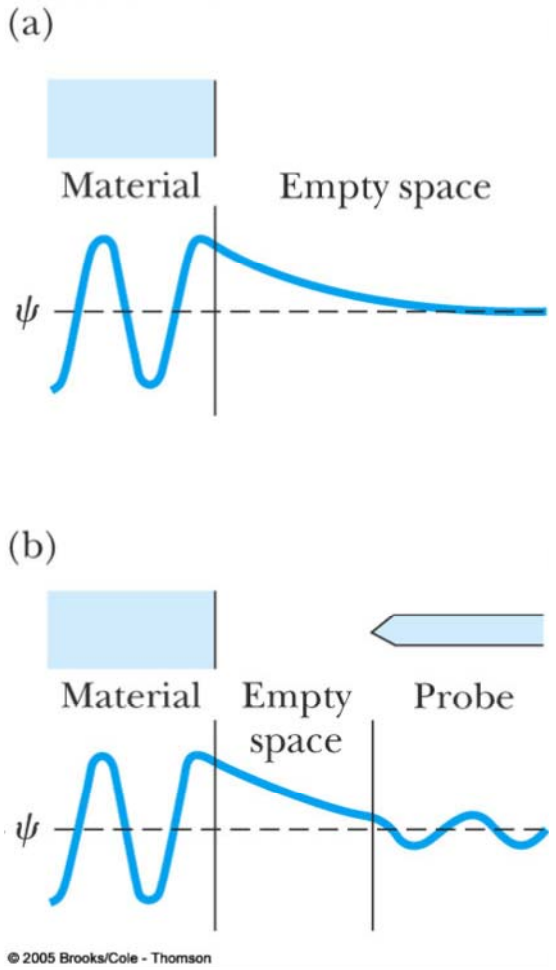
Scanning Tunneling Microscope (STM)

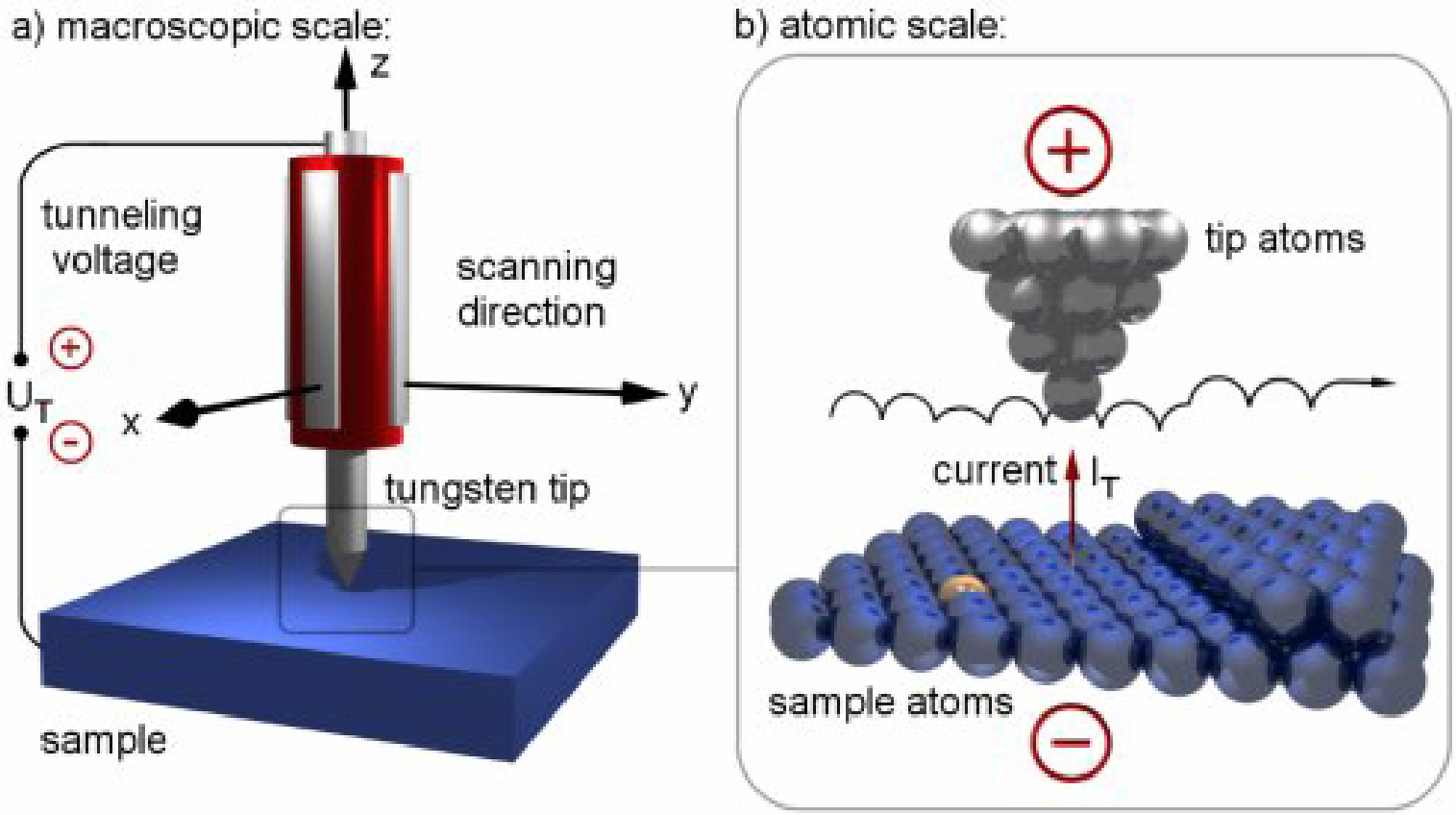


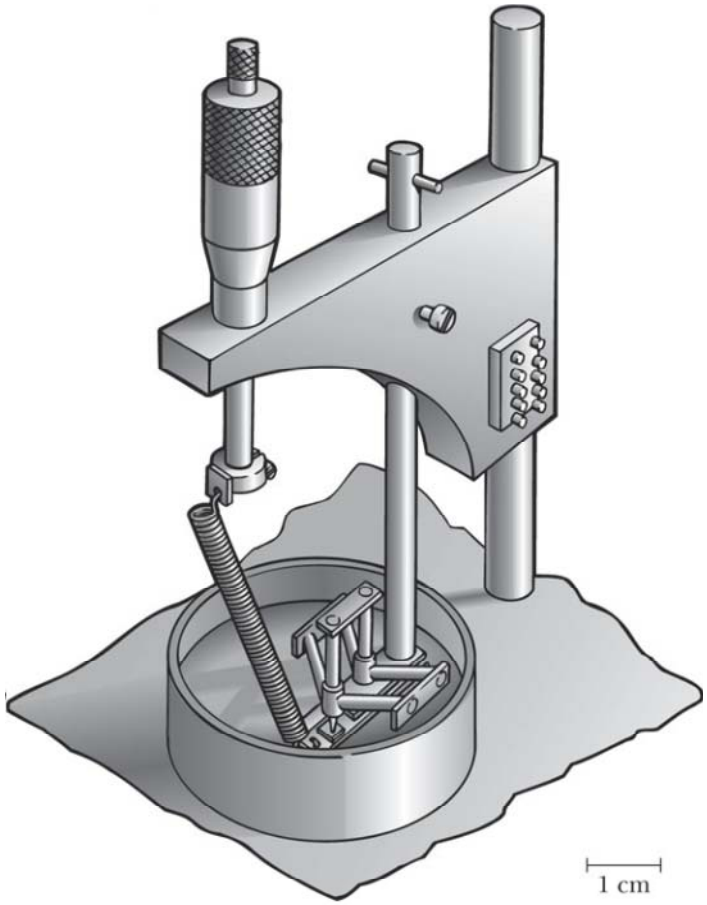
Gerd Binnig
(1947-)

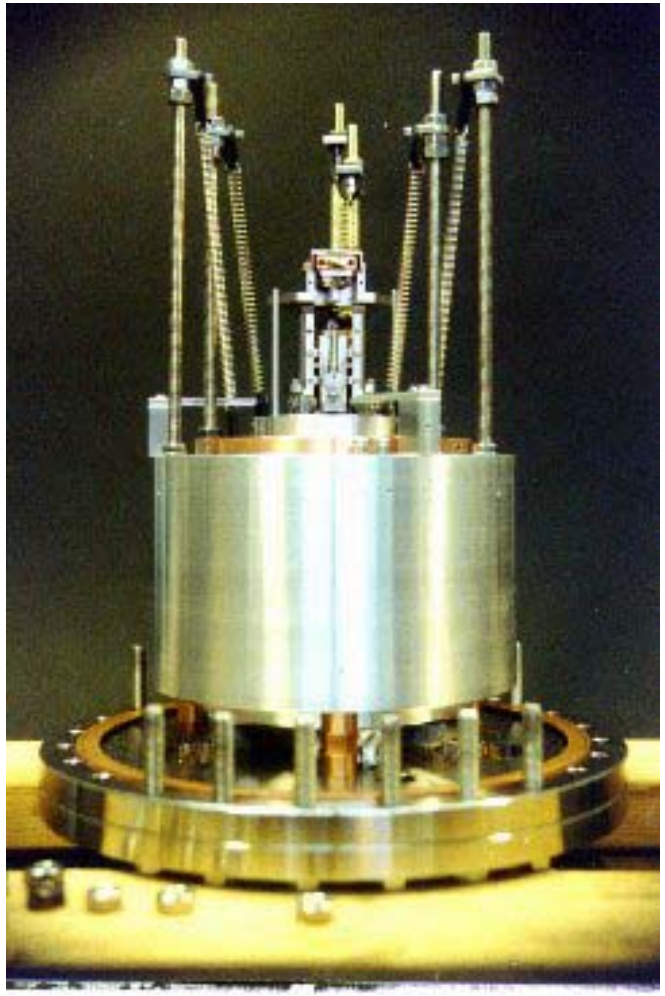


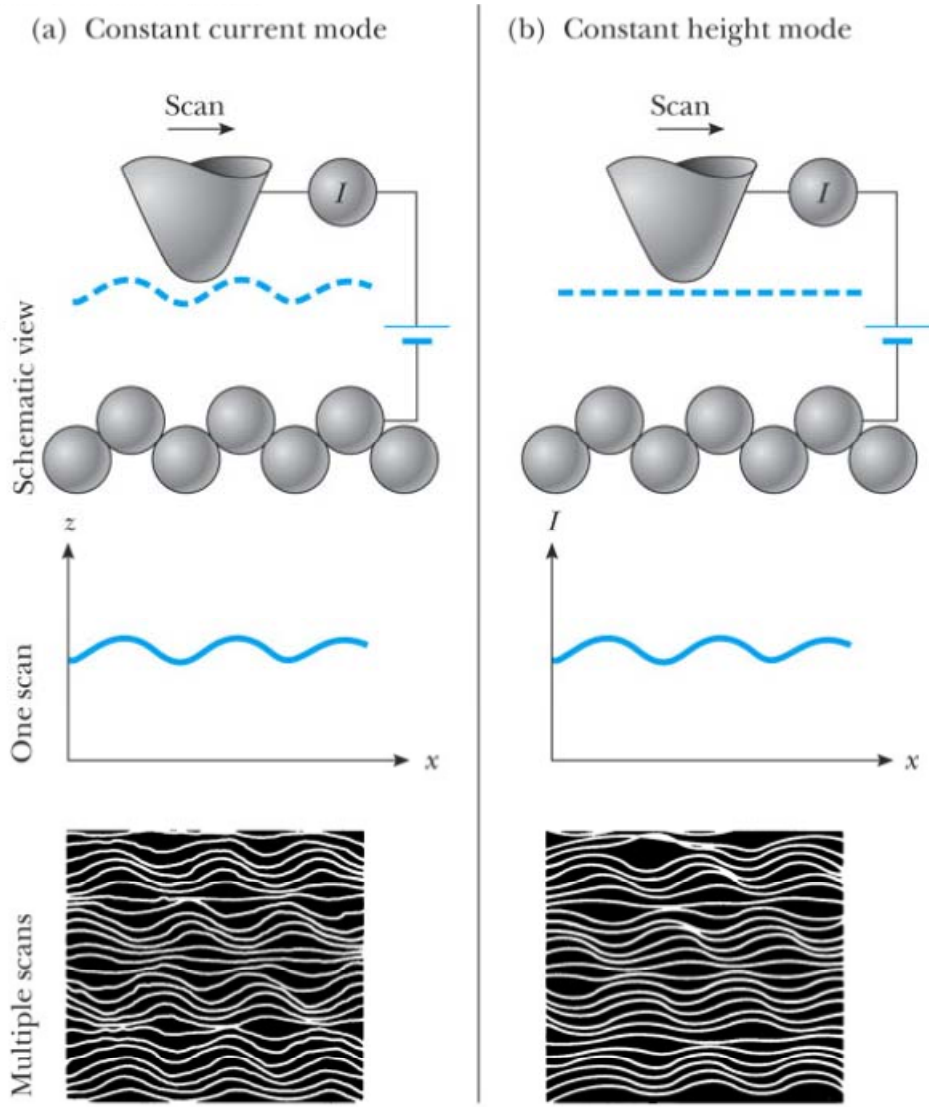
Heinrich Rohrer
(1933-)

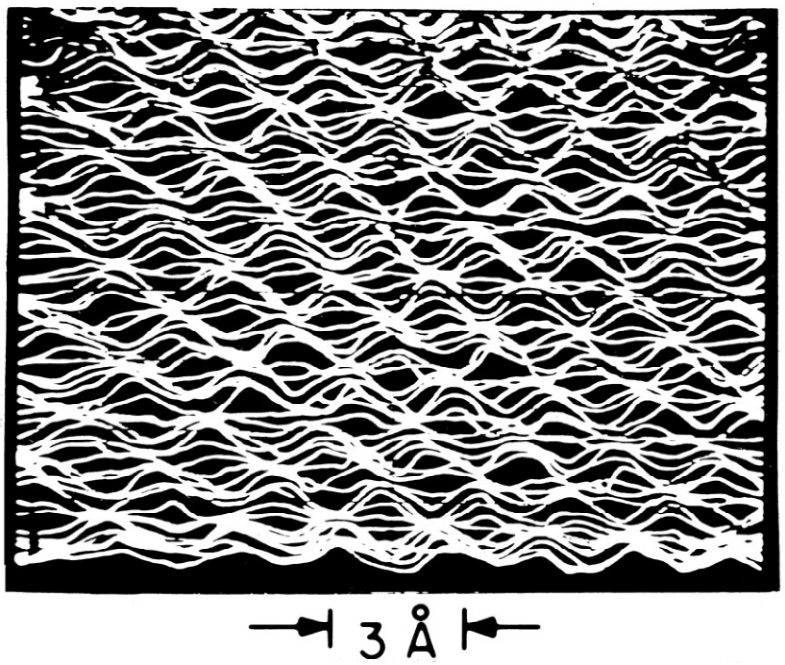


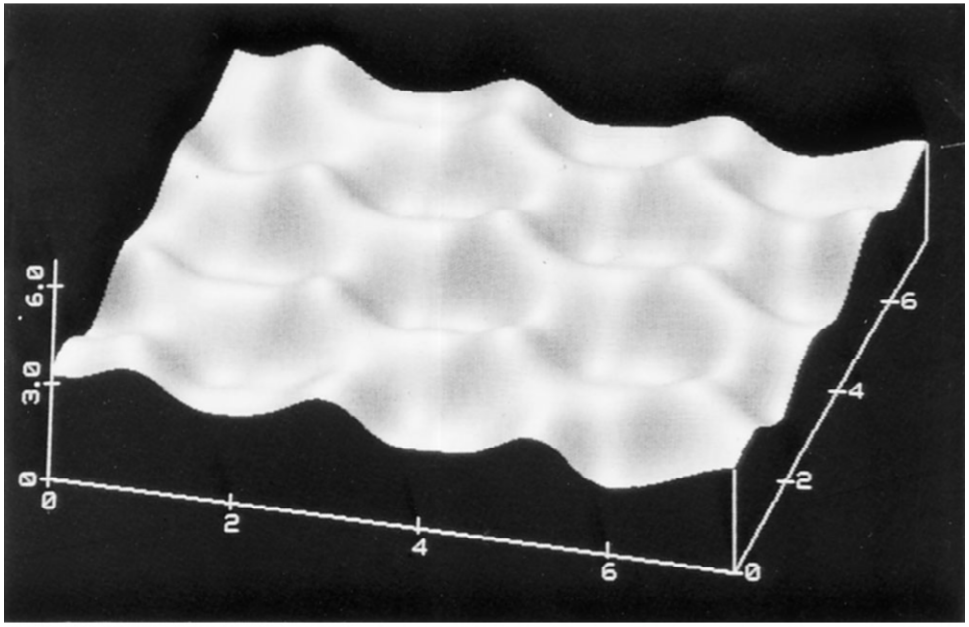

a) macroscopic scale:
z
tunneling
voltage
scanning
direction
U_T
x
y
tungsten tip
sample
b) atomic scale:
tip atoms
current I_T
sample atoms



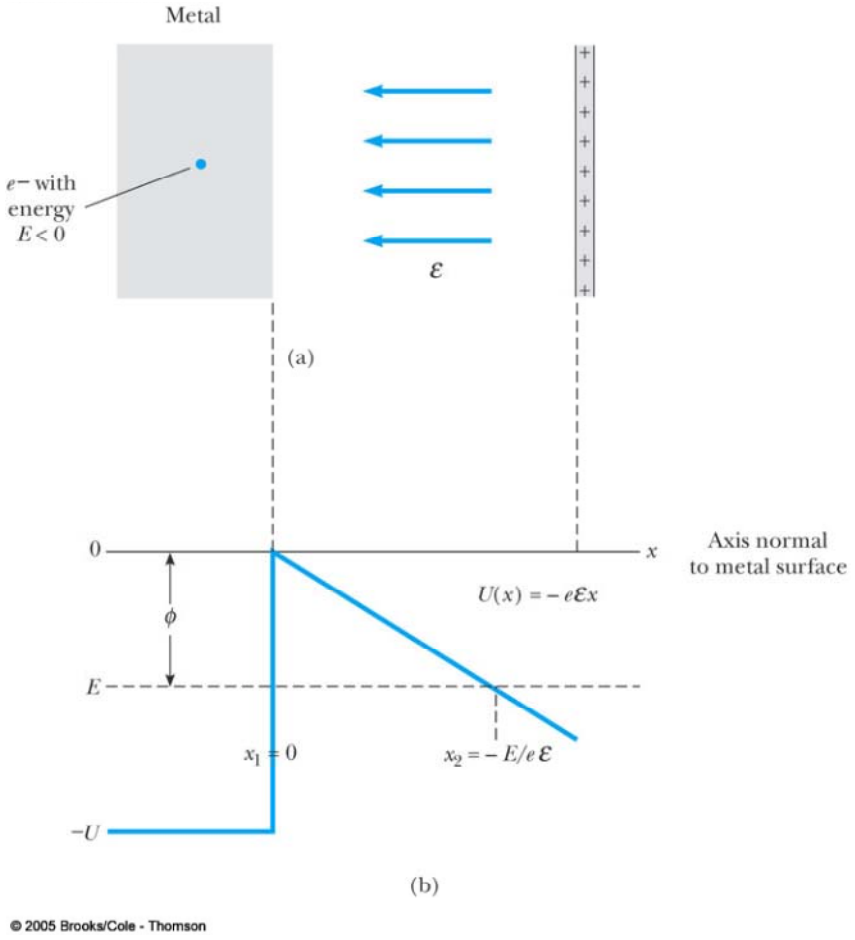




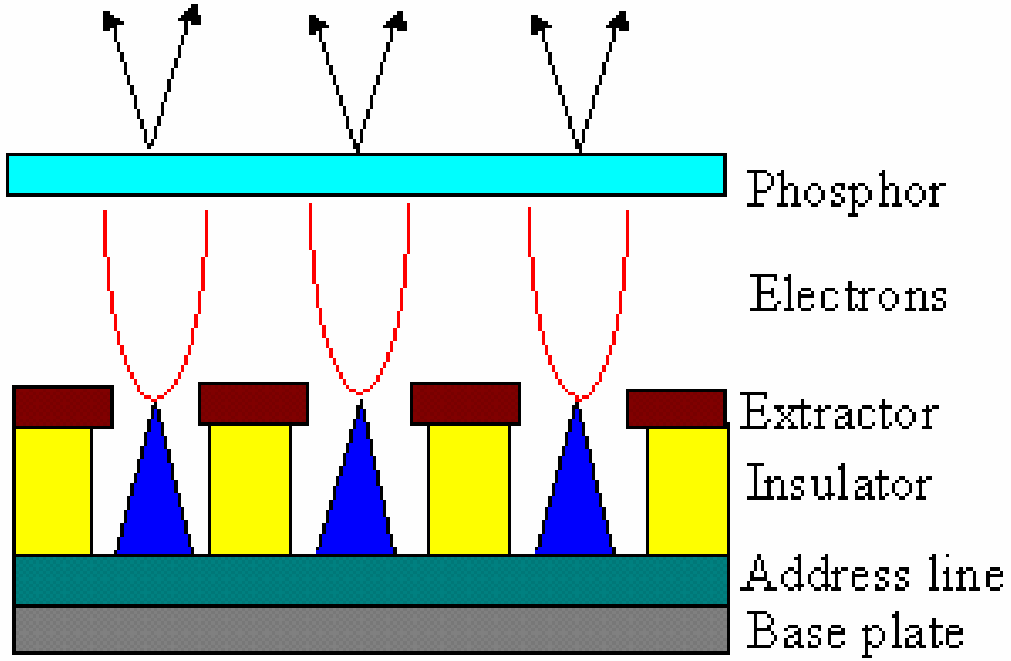


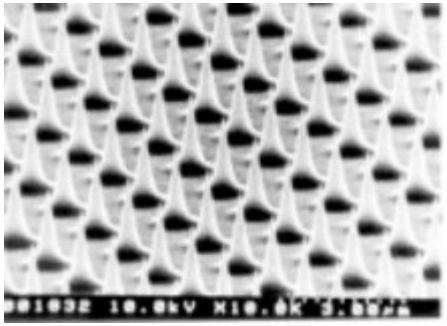


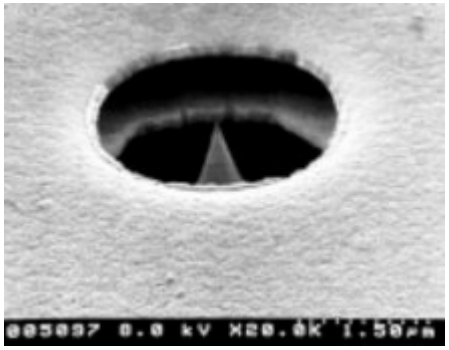
Field Emission

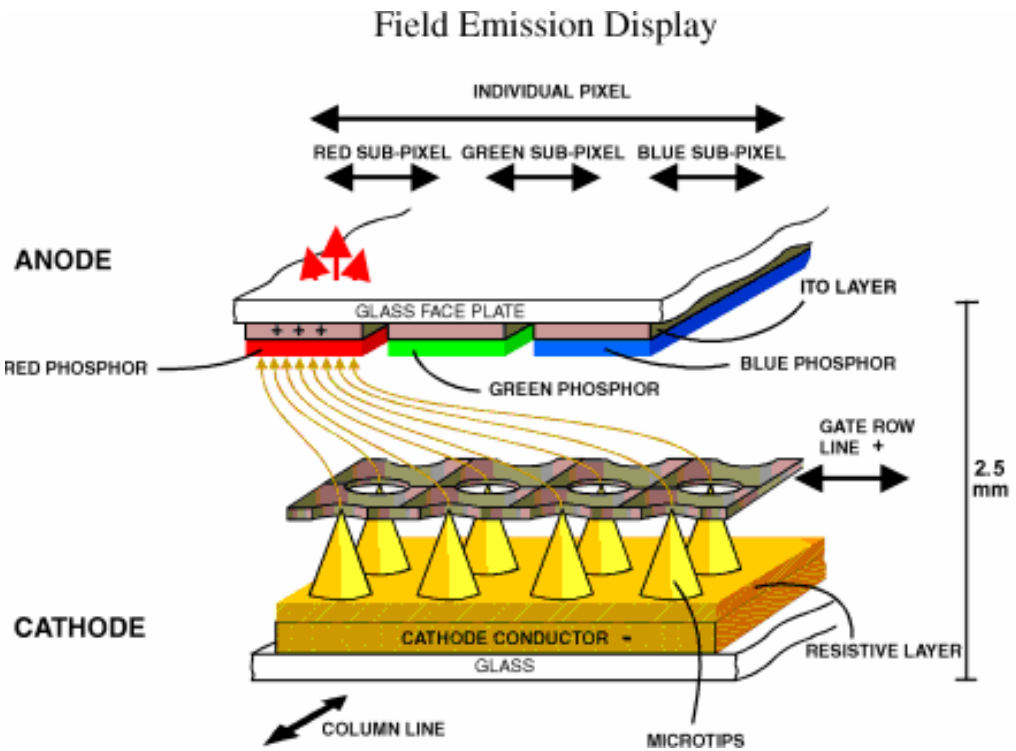


Field Emission Display (FED)



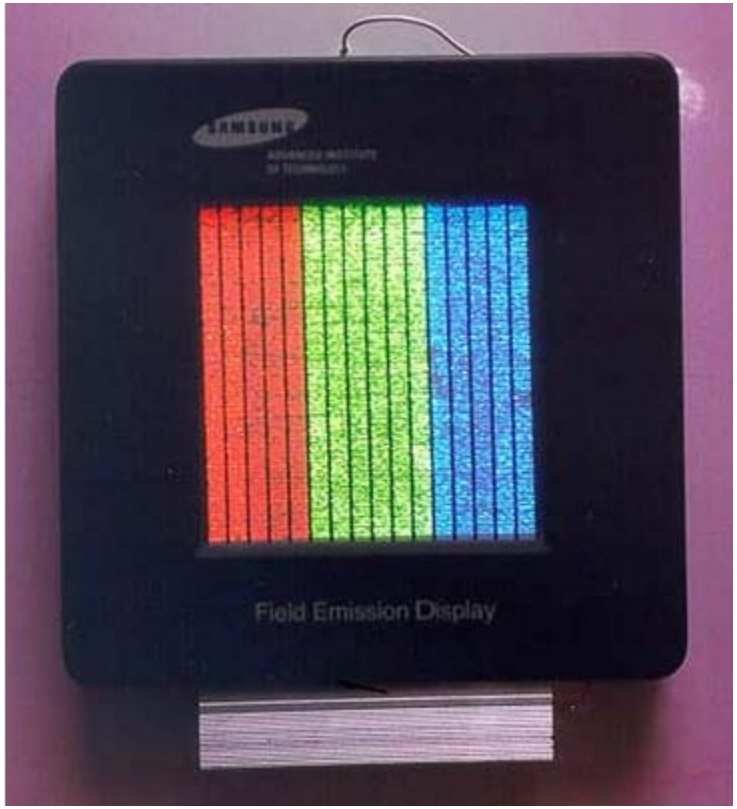


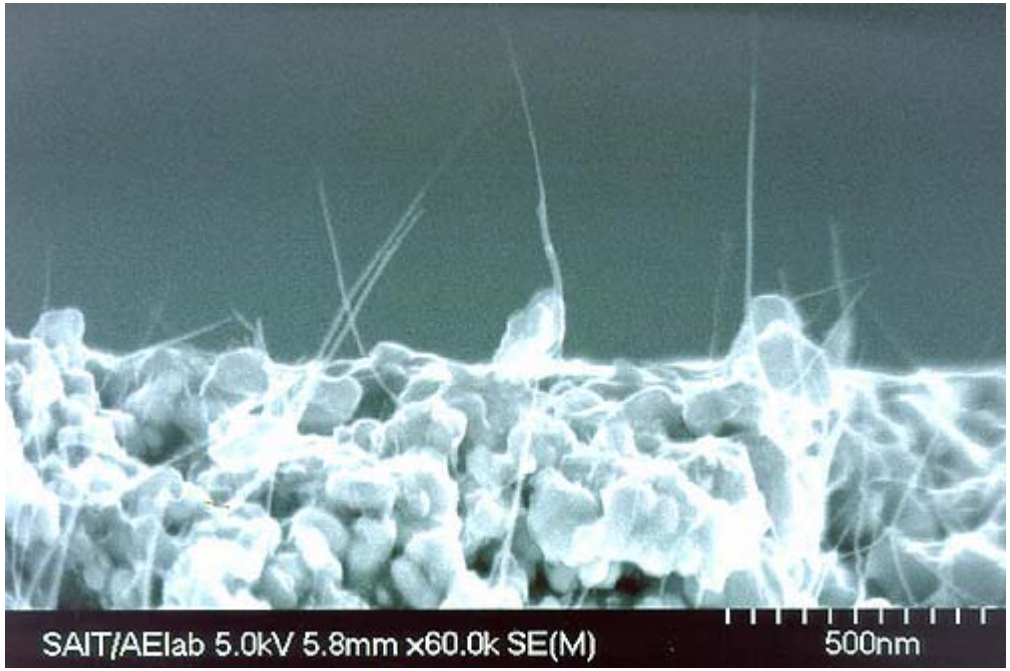



Field Emission Display
INDIVIDUAL PIXEL
RED SUB-PIXEL
GREEN SUB-PIXEL
BLUE SUB-PIXEL
ANODE
GLASS FACE PLATE
ITO LAYER
RED PHOSPHOR
GREEN PHOSPHOR
BLUE PHOSPHOR
GATE ROW LINE +
2.5 mm
CATHODE
CATHODE CONDUCTOR -
GLASS
RESISTIVE LAYER
COLUMN LINE
MICROTIPS

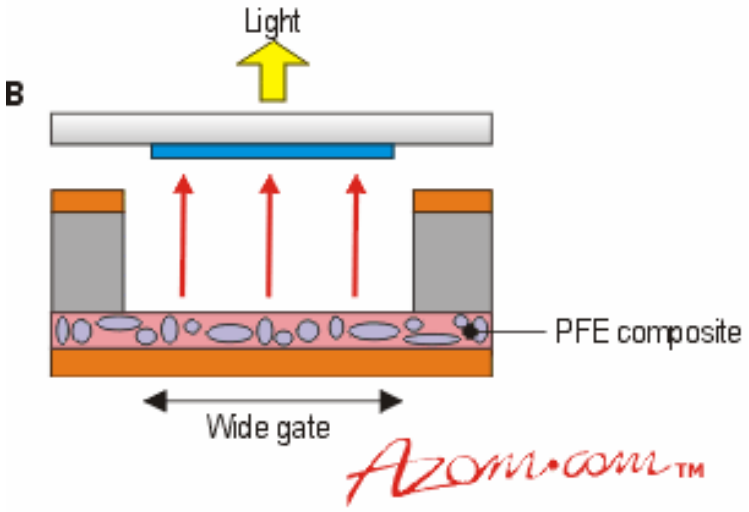

PixTech

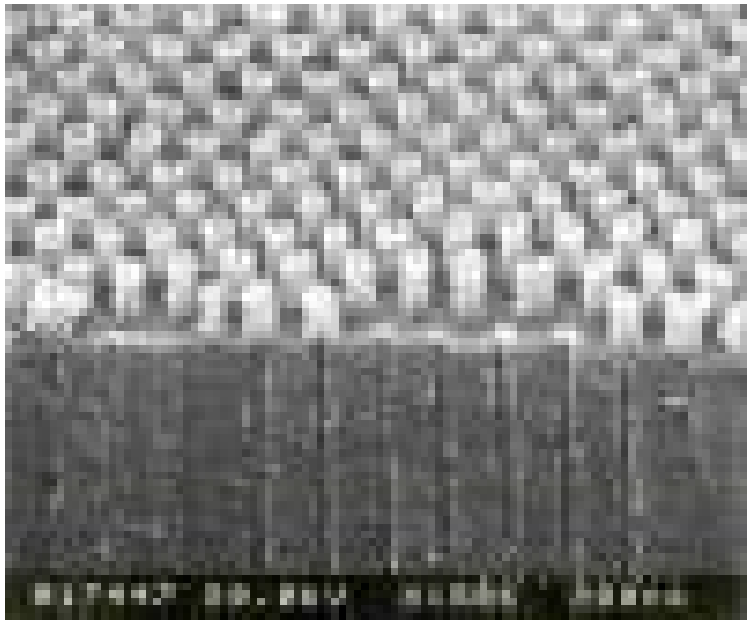
Carbon Nanotube FED





Field Emission Backlight

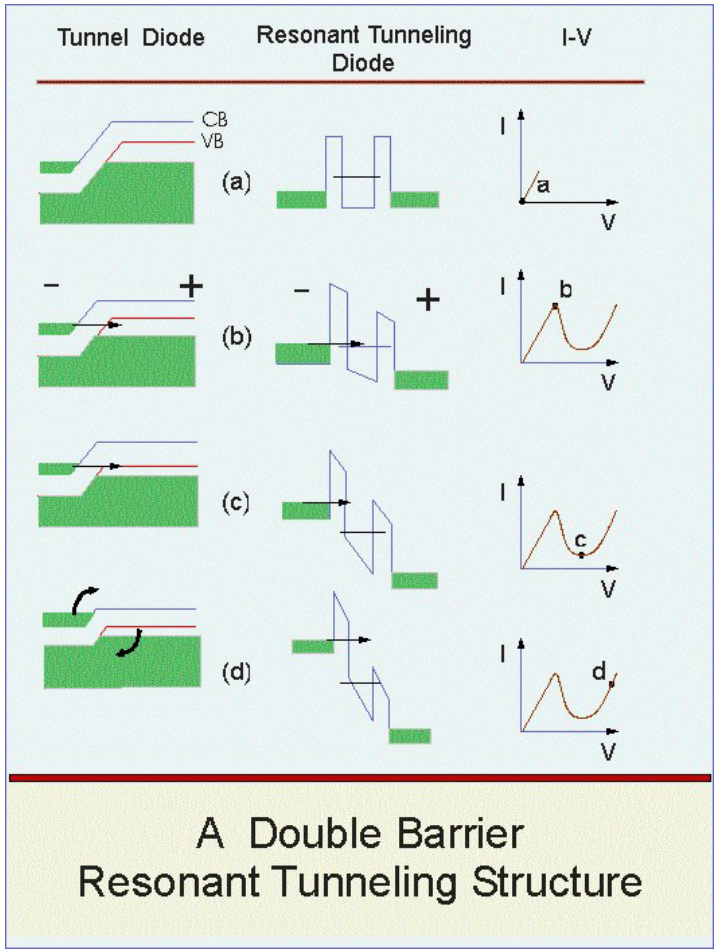




Esaki

Leo Esaki
(1925-)

Tunneling Diode and Resonant Tunneling Diode



Resonant Tunneling

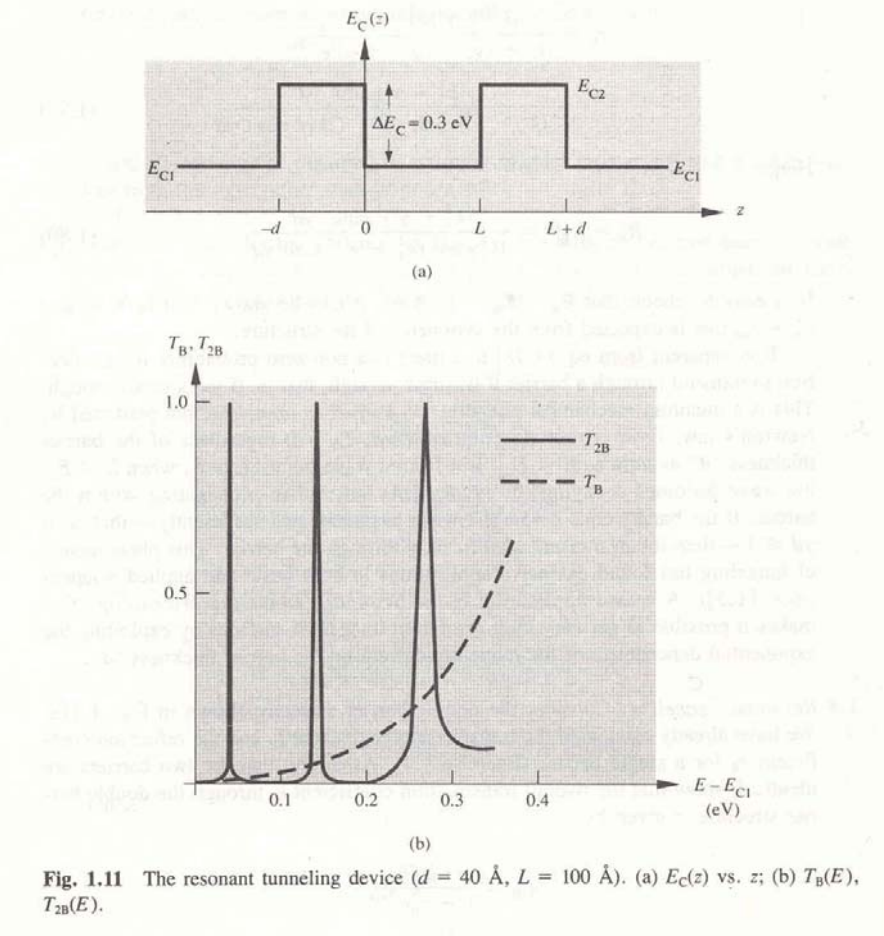
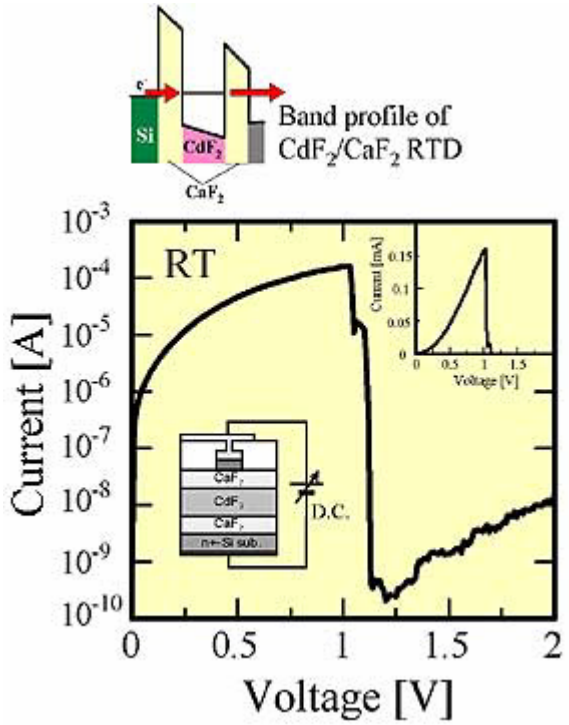
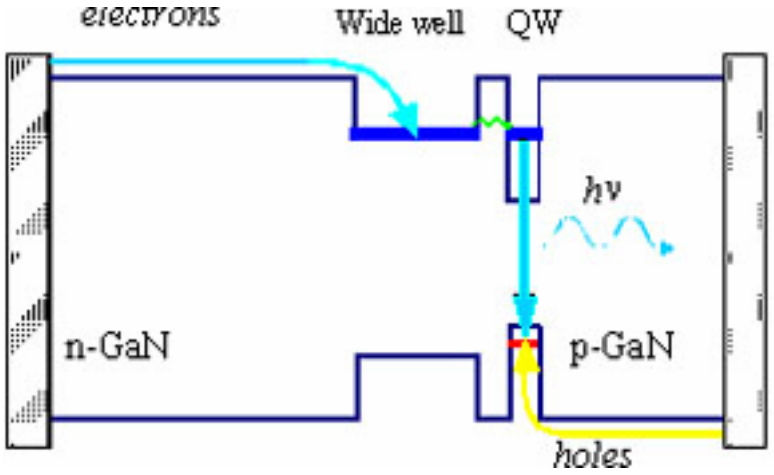


Fig. 1.11 The resonant tunneling device (d = 40 Å, L = 100 Å). (a) $E_C(z)$ vs. z; (b) $T_B(E)$, $T_{2B}(E)$.

Tunneling and Resonant Tunneling





Superlattices