



INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



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SPRING COLLEGE ON AMORPHOUS SOLIDS
AND THE LIQUID STATE

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IMPURITIES, TRAPS AND RECOMBINATION CENTRES IN A SiH_x

Additional transparencies

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These are preliminary lecture notes, intended only for distribution to participants.
Missing or extra copies are available from Room 230.

LECTURE I

PRINCIPAL THEME OF LECTURES:

DENSITY OF GAP STATES (DGS) IN α -SiH_x

WHY DGS?

BECAUSE DGS PROVIDES FUNDAMENTAL INFO ON:

- DISORDER AND DEFECTS
- PERFORMANCE OF DEVICES

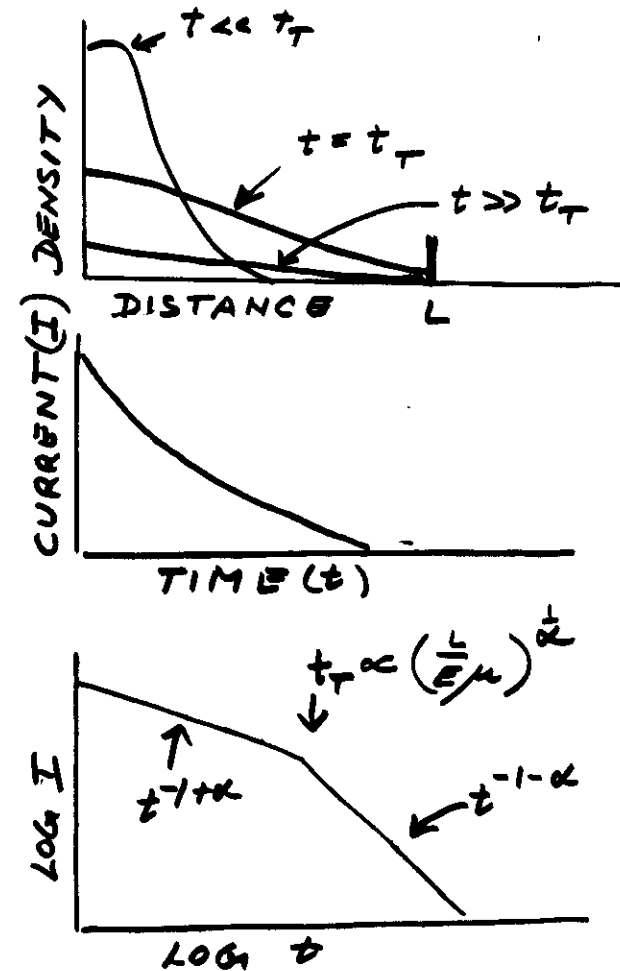
WHY α -SiH_x

- DGS CAN BE VARIED ORDERS OF MAGNITUDE
- DGS CAN BE MEASURED READILY
- WORLD INTEREST IN SOLAR CELLS, FET TRANSISTORS, VIDICONS, XEROGRAPHY
- RESULTS CAN BE EXTENDED TO OTHER SYSTEMS

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LECTURE II

DISPERSIVE TRANSPORT



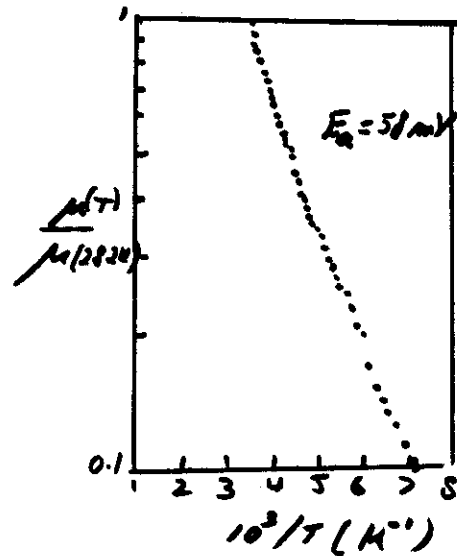
Few TRAPPING AND EMISSION EVENTS DURING t_T

α -DISPERSION PARAMETER

$$\alpha < 1$$

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LECTURE II
PHOTOCONDUCTIVITY DECAY ~ 10 ps
(AUSTON ET AL)



$$E_a \approx kT_c \ln \omega_0 \tau$$

$$\tau = 25 \text{ ps}$$

$$\omega_0 = 4 \times 10^{11} \text{ s}^{-1}$$

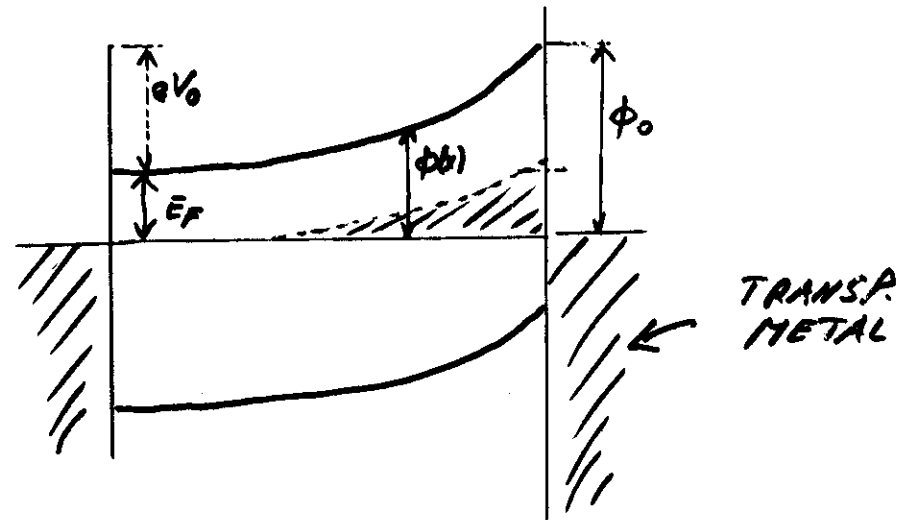
$$T_c = 312^\circ \text{K}$$

$$E_a = 61 \text{ mV}$$

MOBILITY THERMALLY ACTIVATED
EVEN FOR $\tau \sim 25$ ps.

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LECTURE III
SCHOTTKY BARRIER



$$e \frac{d^2 \phi}{dx^2} = e \int_{E_F - \phi(x)}^{E_F} N(E) dE = e n_0$$

$$V = V_0 e^{-\frac{x}{x_0}}$$

$$x_0 = \sqrt{\frac{\epsilon}{n_0 e}}$$

$$V_0 = 0.5 \text{ V (Pd)} \\ 0.6 \text{ V (Pt)}$$

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