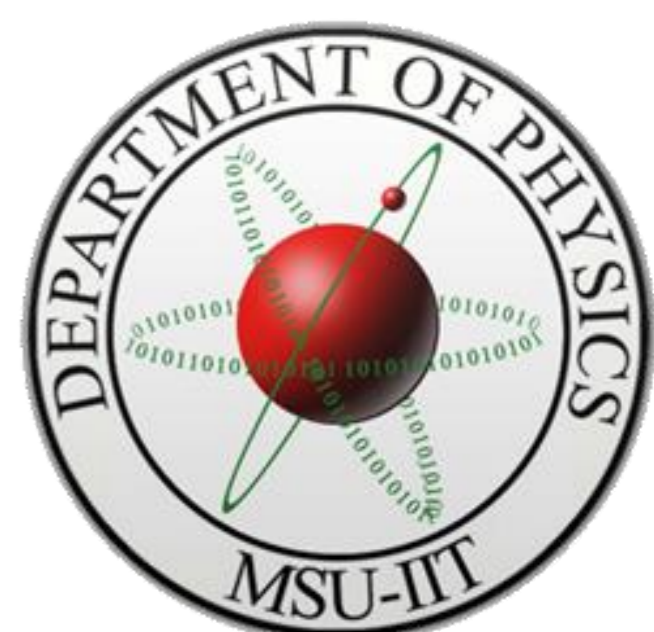




Observation of more than one direct optical transitions of polyaniline films on glass and on Si(100)



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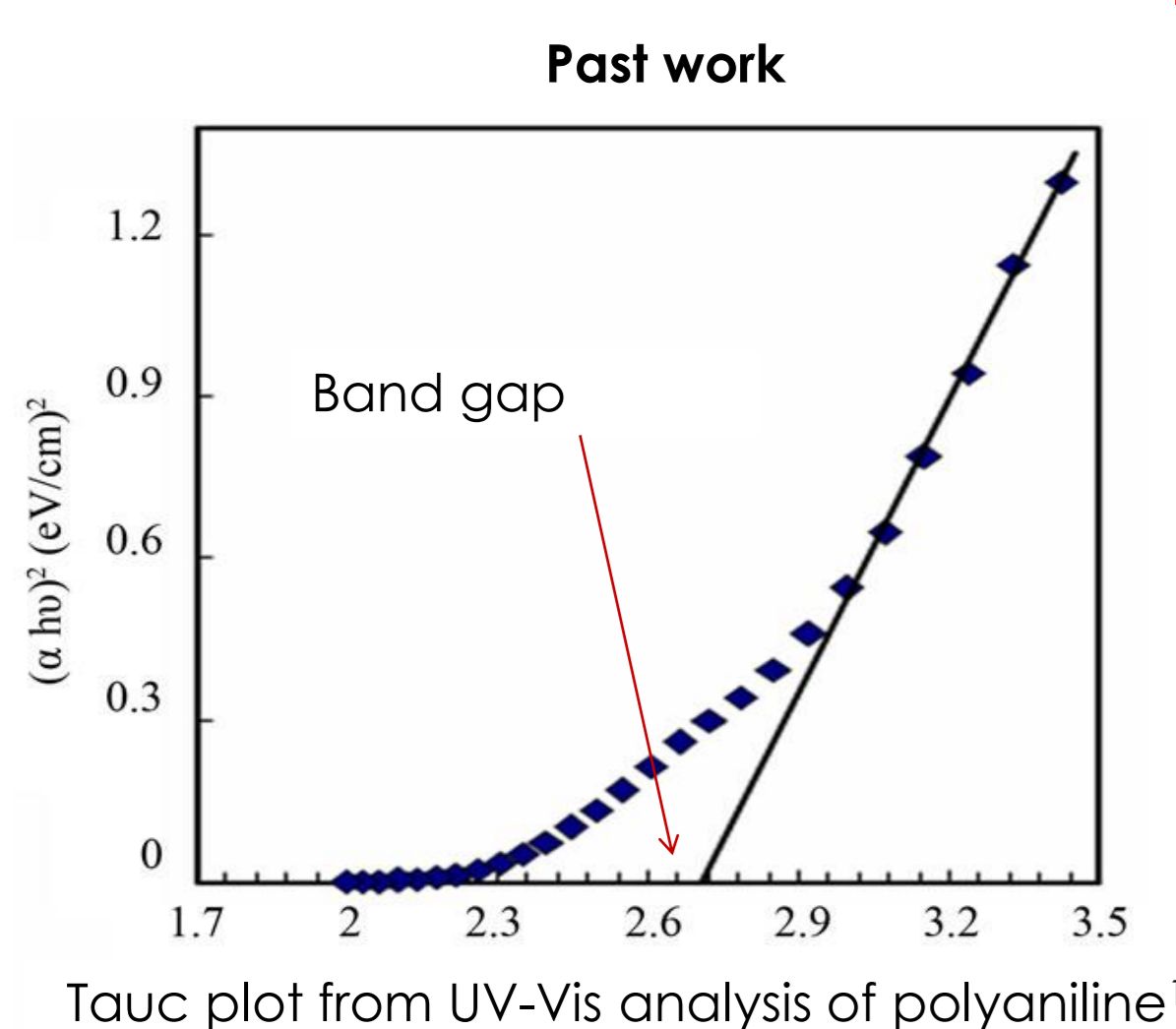
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Introduction



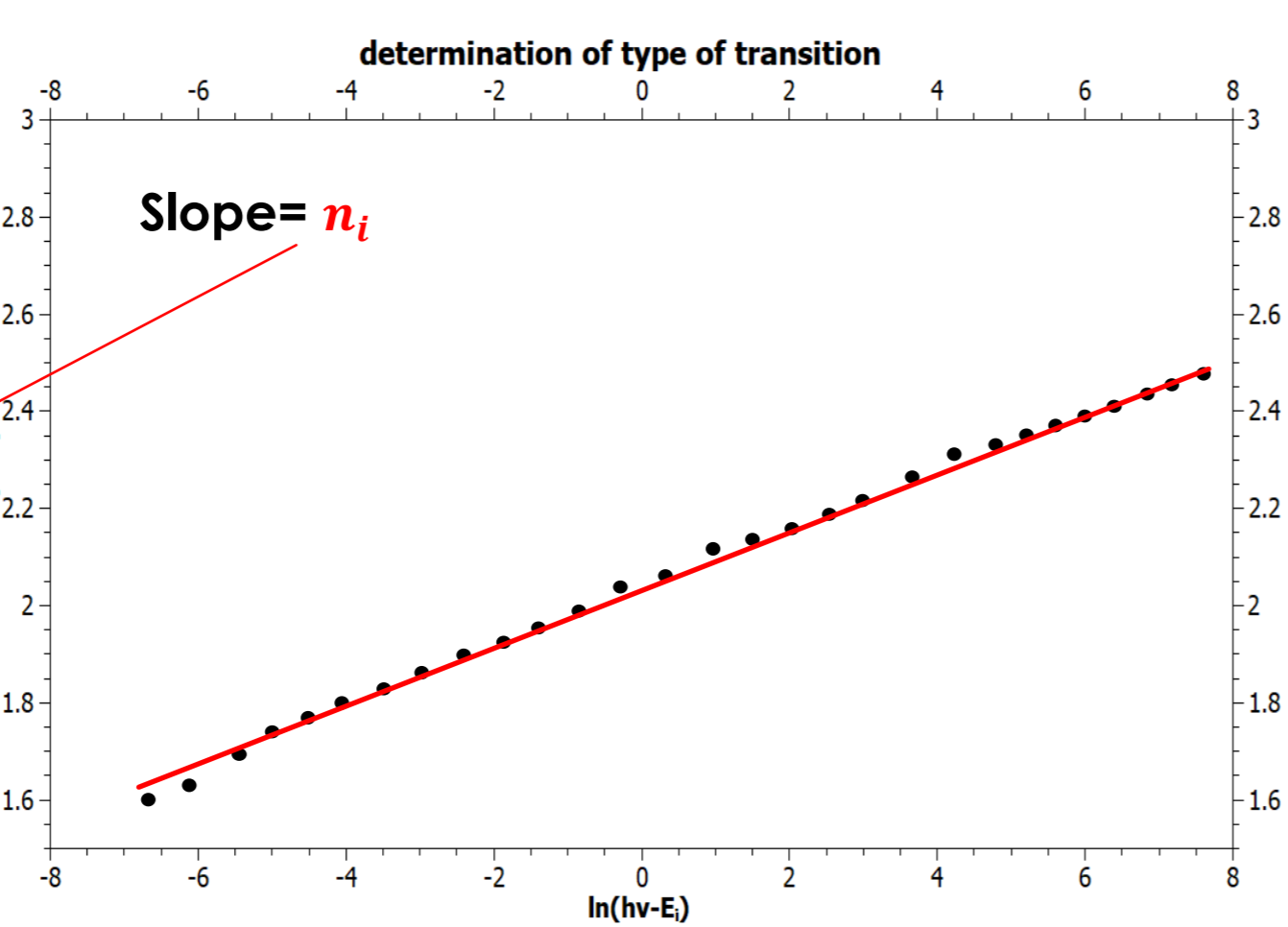
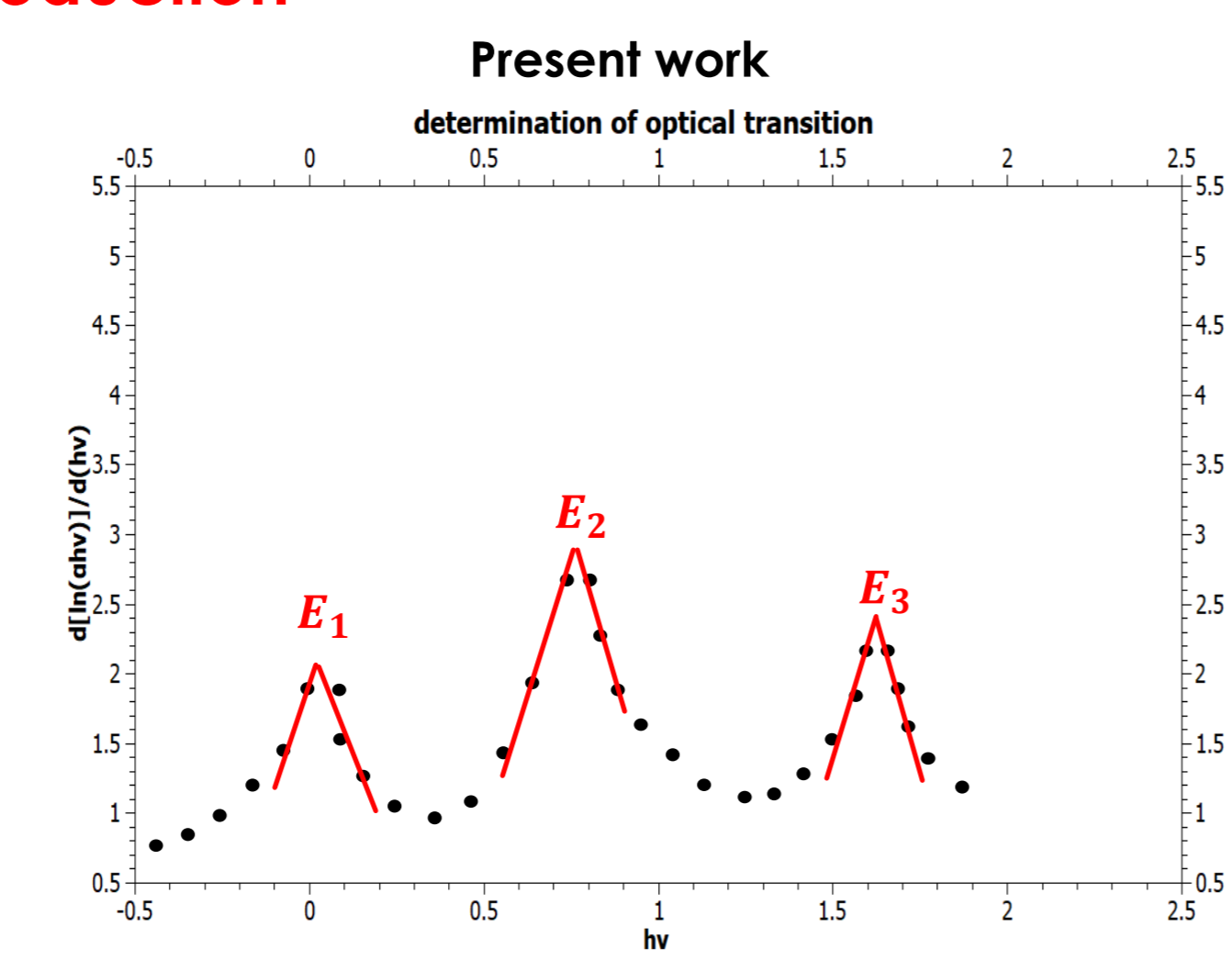
Tauc relation

$$(\alpha hv)^{1/n} = A(hv - E_i)$$

$n = ?$

Nature of transition

$n = 1/2, 2$ for direct and indirect allowed transition
 $n = 3/2, 3$ for direct and indirect forbidden transition



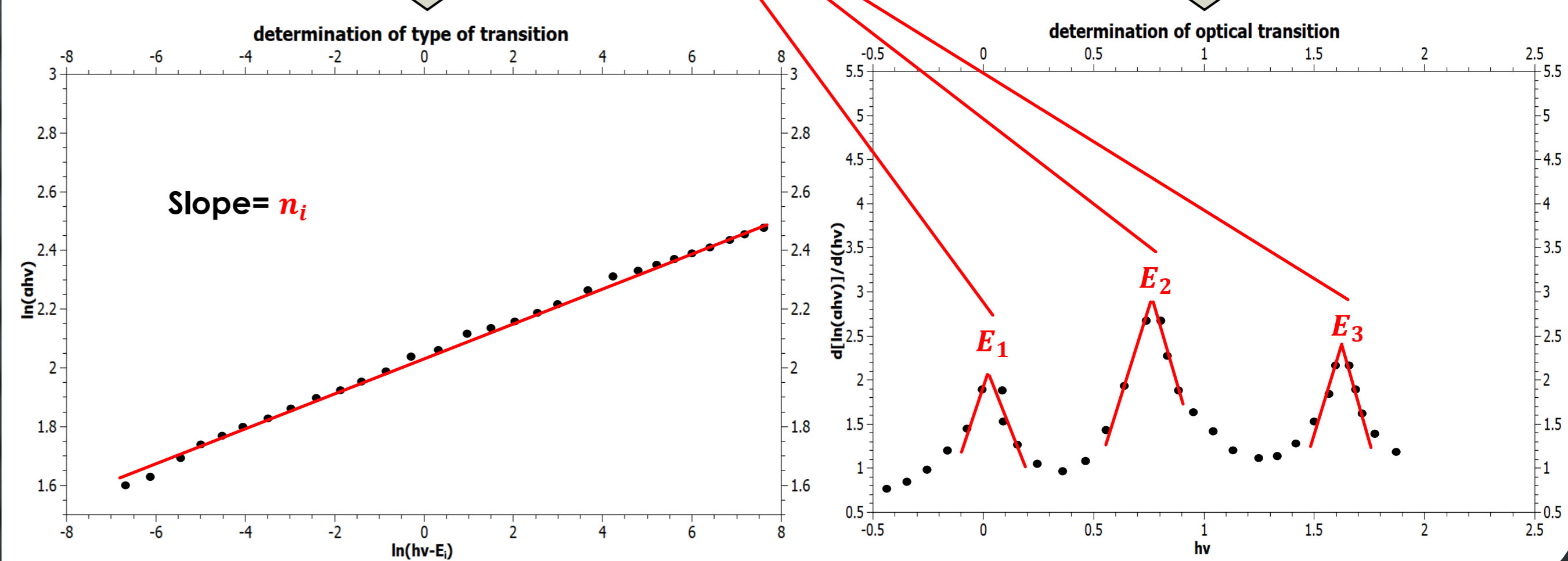
Methodology

$$\alpha = \sum_i \alpha_i = \sum_i \frac{A_i (hv - E_i)^{n_i}}{hv}$$

$$\alpha hv = \sum_i A_i (hv - E_i)^{n_i}$$

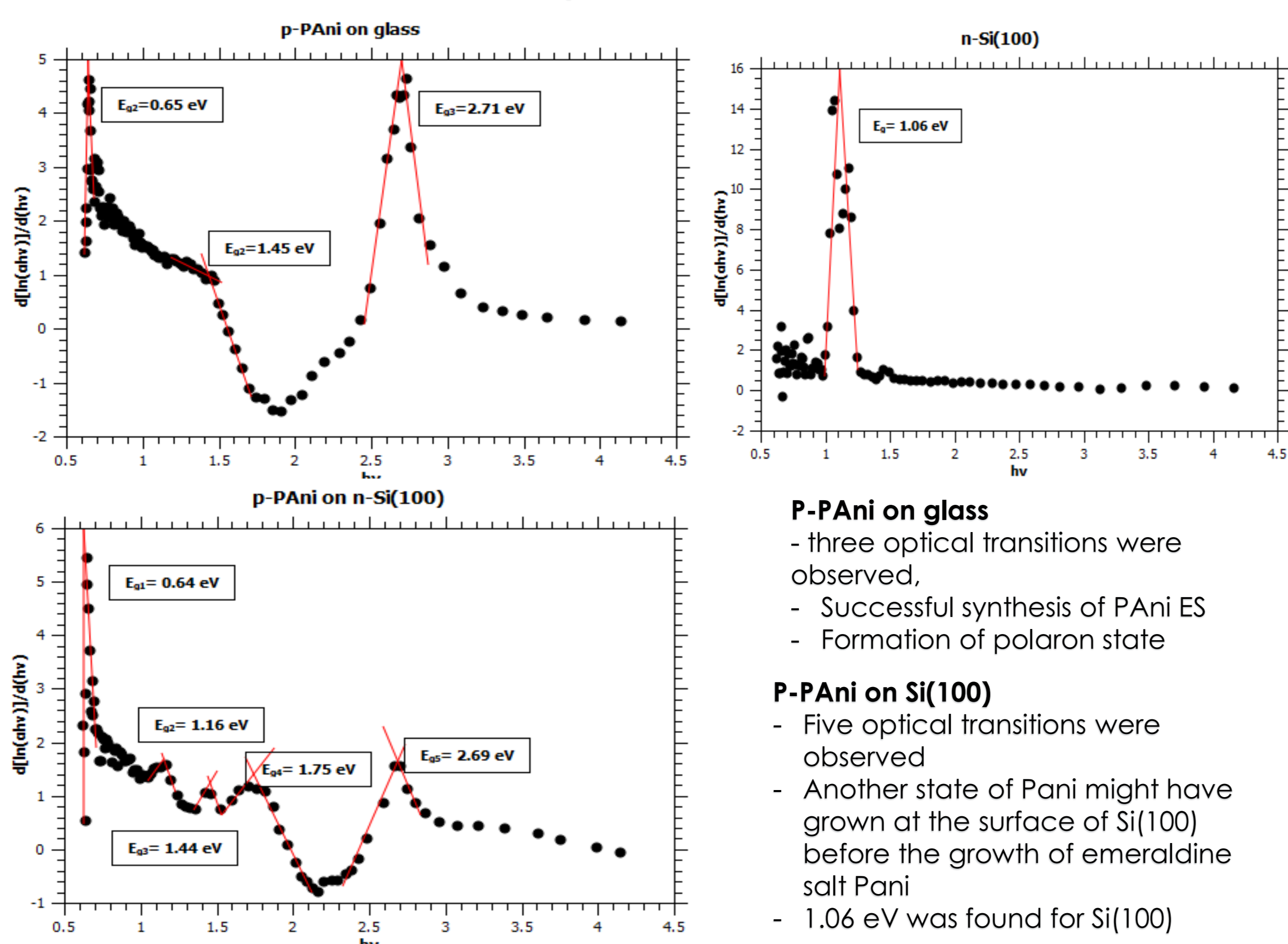
$$\ln(\alpha hv) = \sum_i \ln(A_i) + \ln(hv - E_i)^{n_i}$$

$$\frac{d[\ln(\alpha hv)]}{d(hv)} = \frac{n_i}{(hv - E_i)}$$



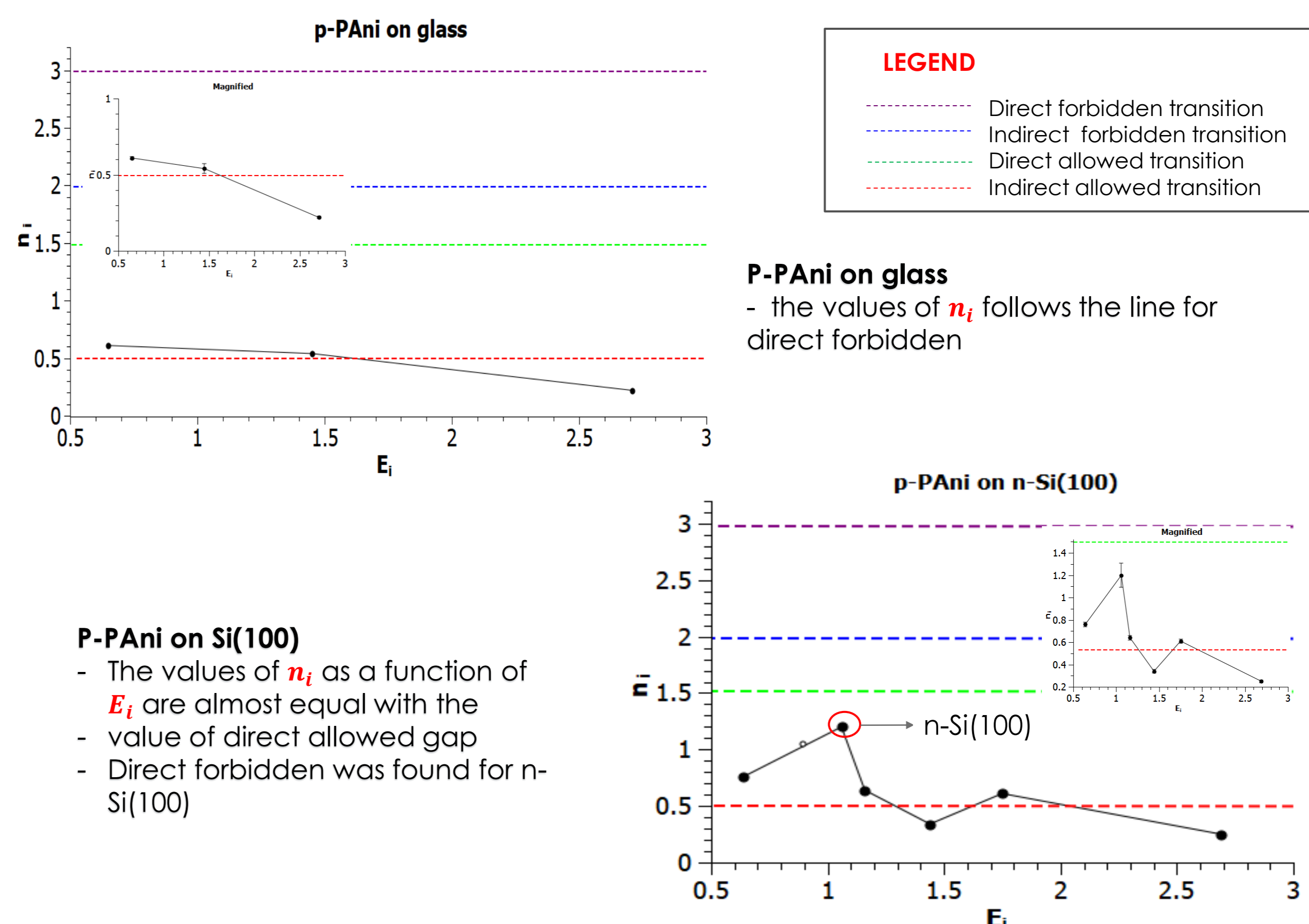
Results and Discussion

Optical transitions



- P-PANI on glass**
- three optical transitions were observed,
 - Successful synthesis of PANi ES
 - Formation of polaron state
- P-PANI on Si(100)**
- Five optical transitions were observed
 - Another state of Pani might have grown at the surface of Si(100) before the growth of emeraldine salt Pani
 - 1.06 eV was found for Si(100)

Nature of transitions



Conclusion

Using the proposed method for finding the optical transition and the nature of transition, it was found out that there are more than one optical transitions for PANi on glass and Si(100). While a direct allowed transition was found for PANi films, a direct forbidden was found for n-Si(100)

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References

- M. Reda, S., & M. Al-Ghannam, S. (2012). Synthesis and Electrical Properties of Polyaniline Composite with Silver Nanoparticles. *Advances in Materials Physics and Chemistry*, 02(02), 75-81. doi:10.4236/ampc.2012.22013