Radiation damage in p-type boron doped Si

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UNIVERSITY of EXETER

2nd RD50 Workshop

18-20 May 2003

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- Method:
  - ⋆ Boron interstitial defects and boron-impurity complexes investigated
  - ⋆ Use DFT (AIMPRO) to study stability and electrical properties
  - ⋆ Comparison with observed centres

p-type Vs. n-type

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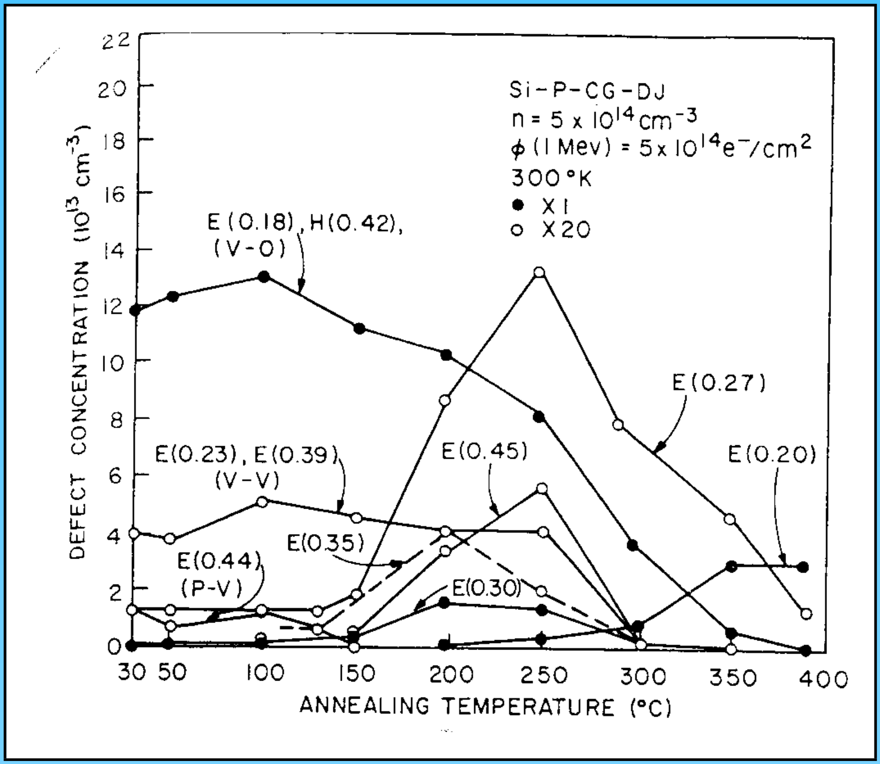

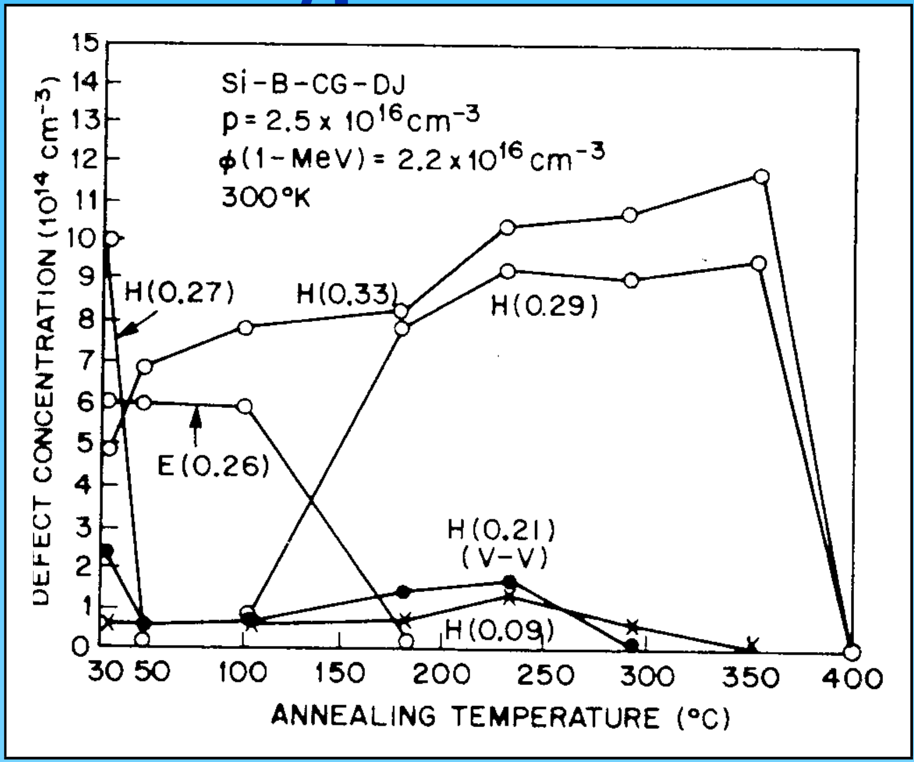

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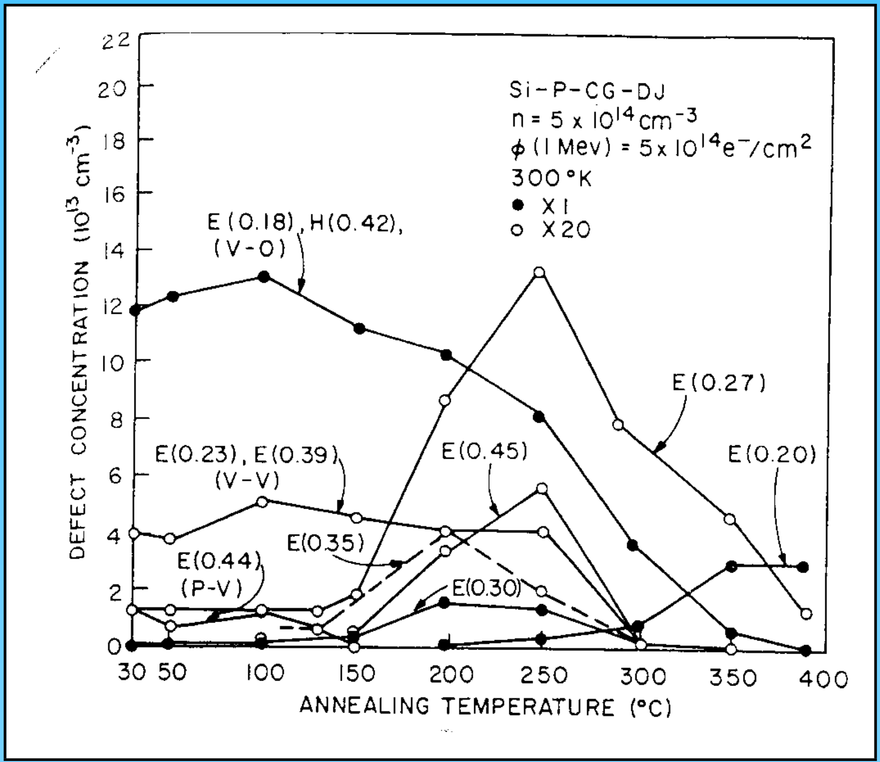

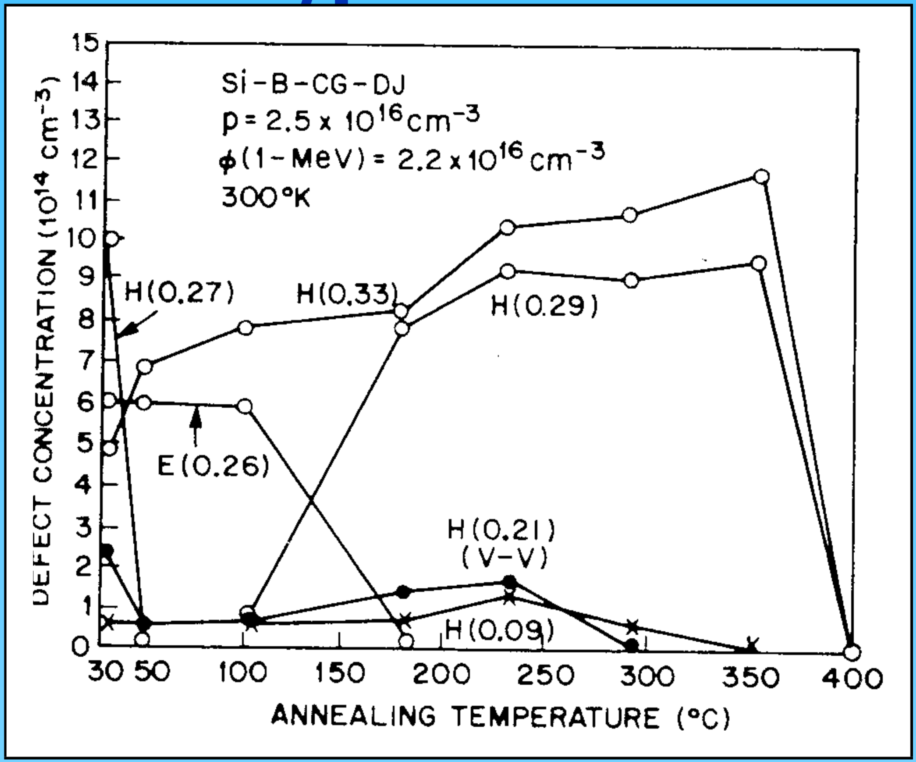

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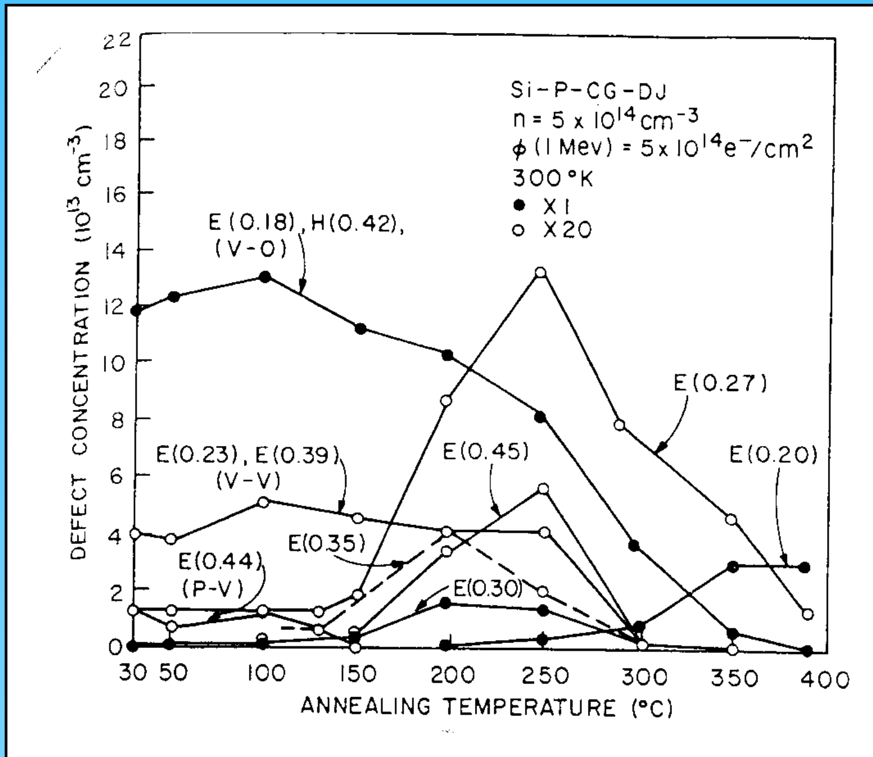

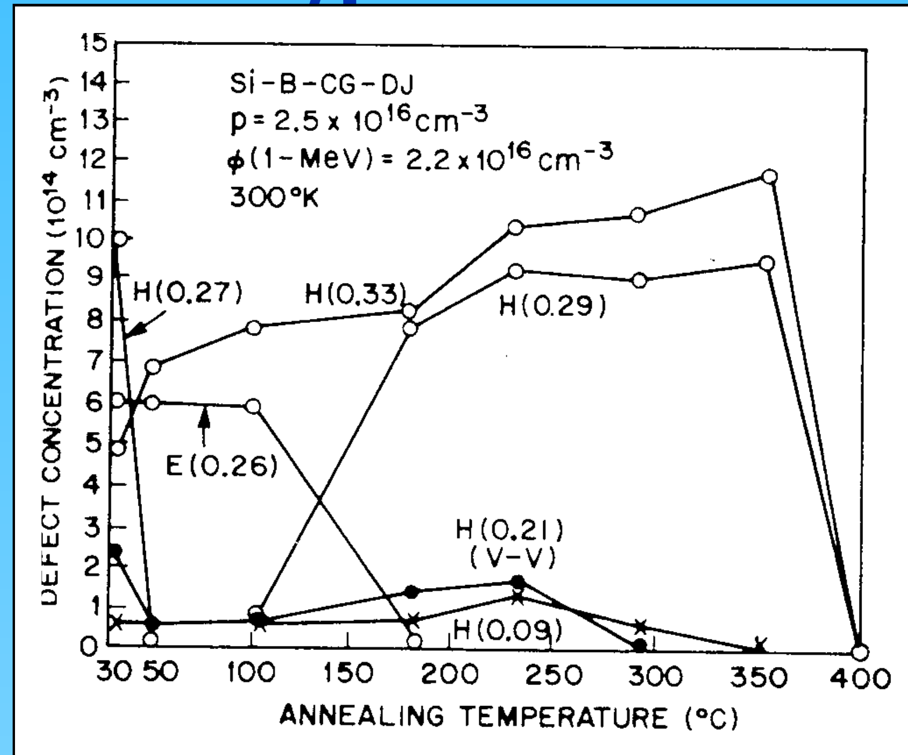

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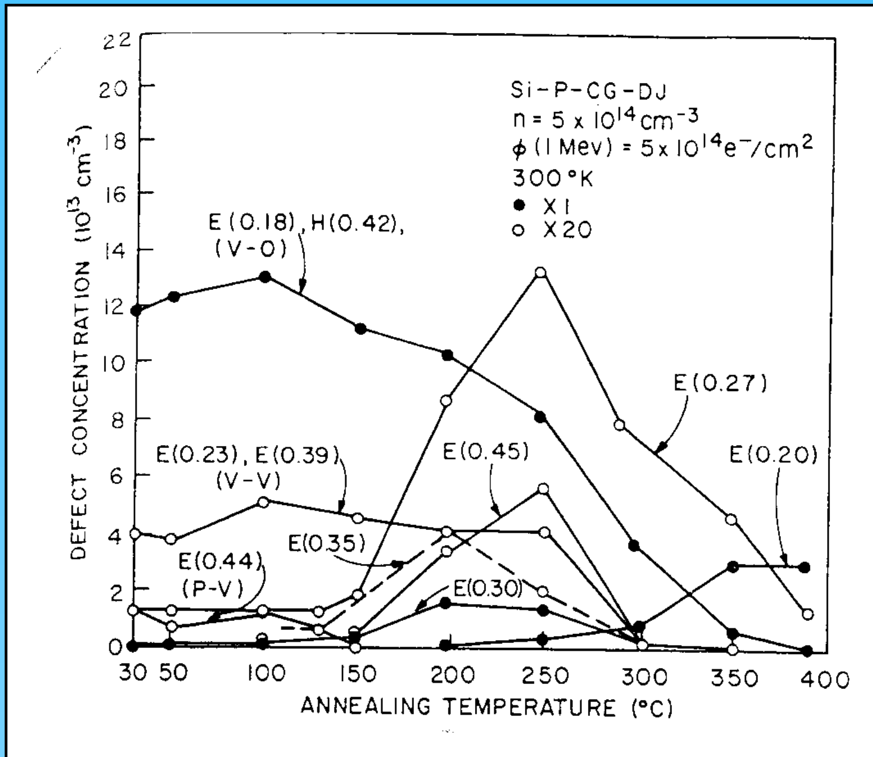

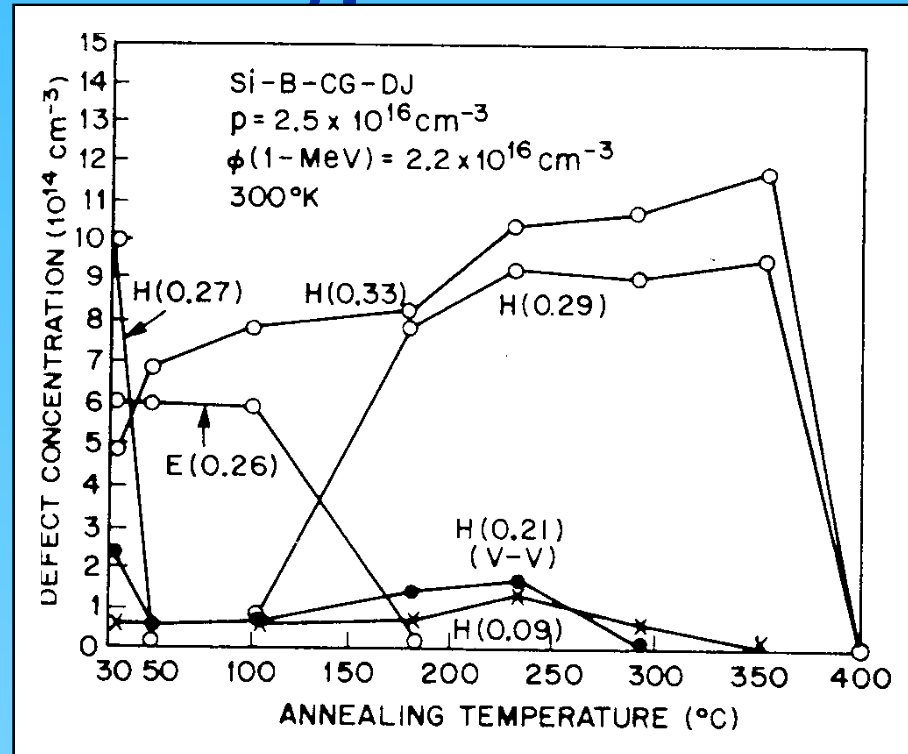

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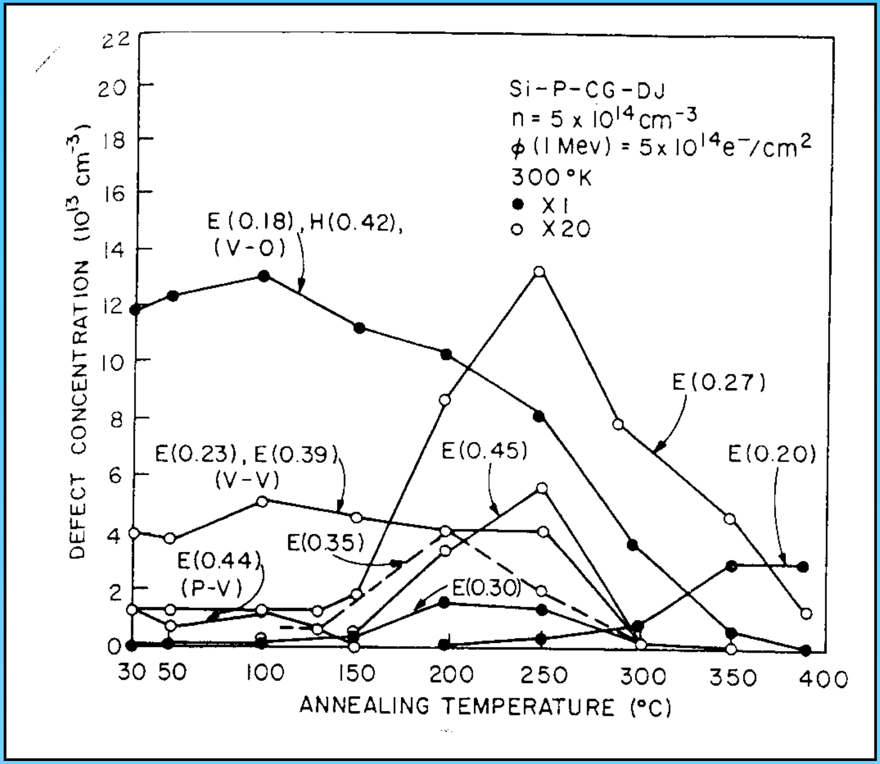

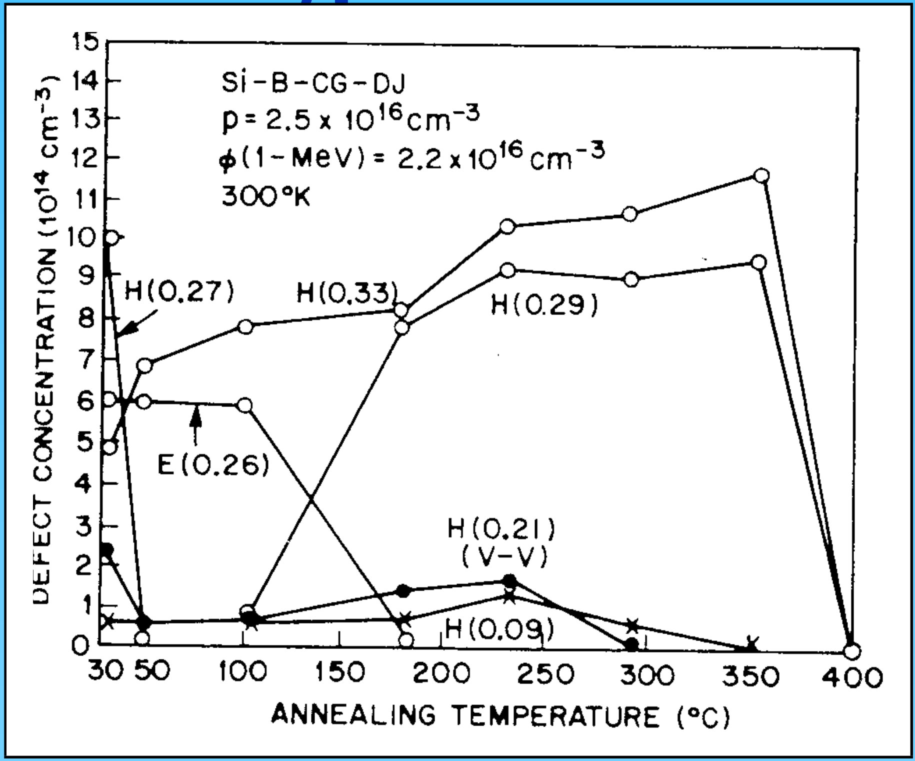

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  - ⋆ Deep level of V_2O acts a recombination centre
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  - ⋆ Mainly shallow (no deep V_2O level)

Boron interstitial defects

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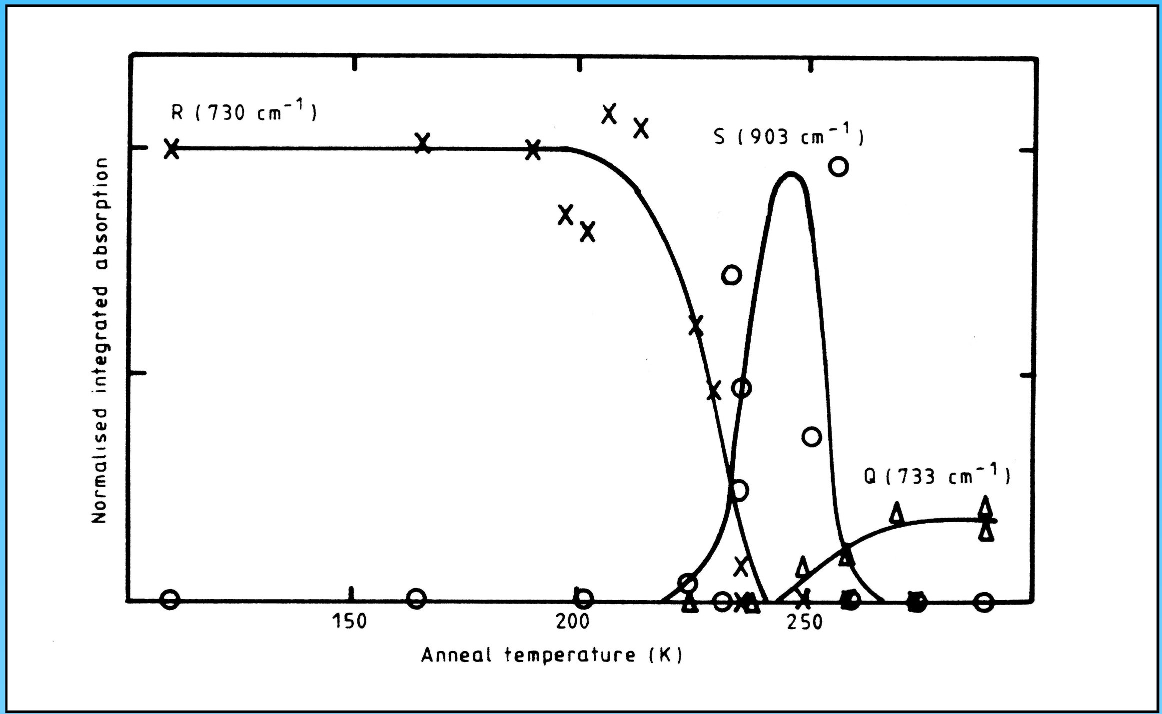

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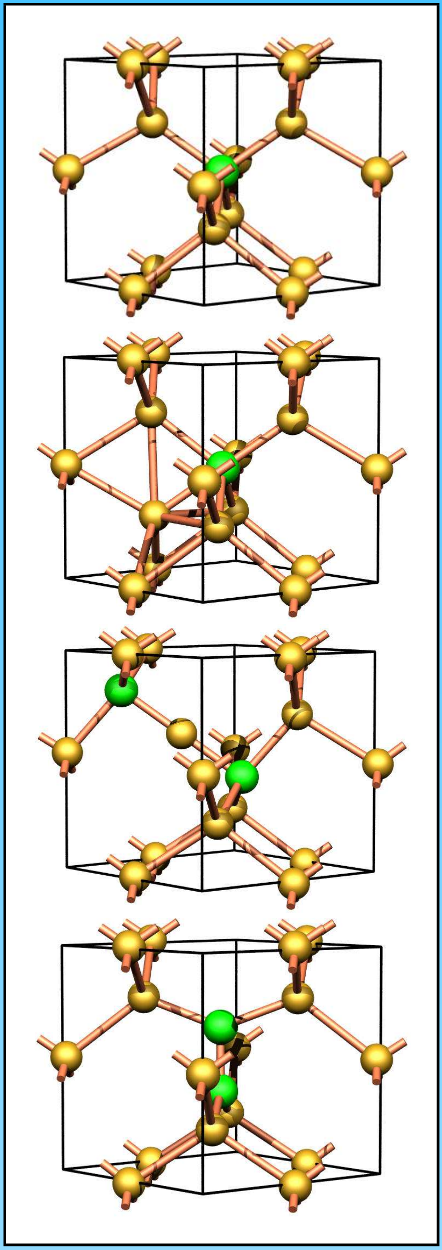

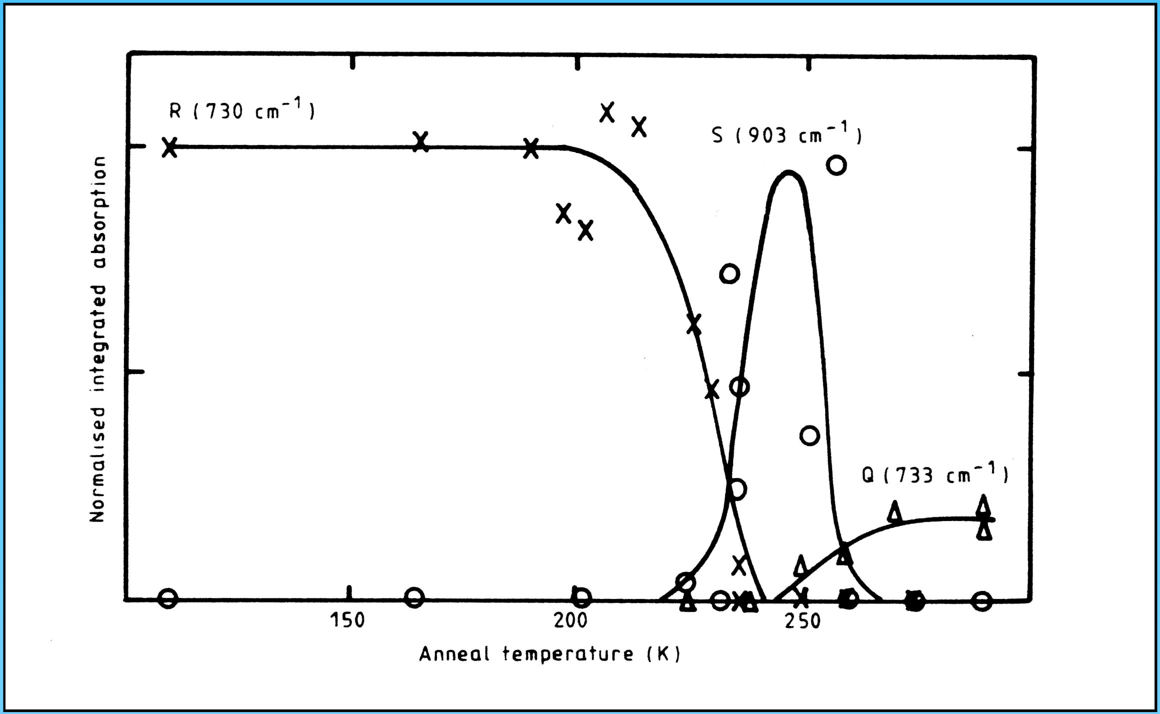

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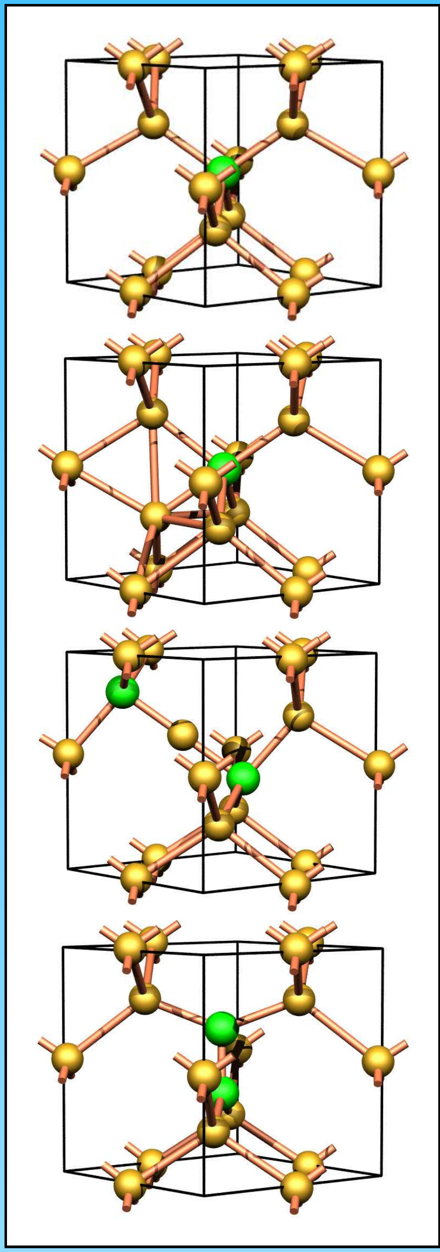

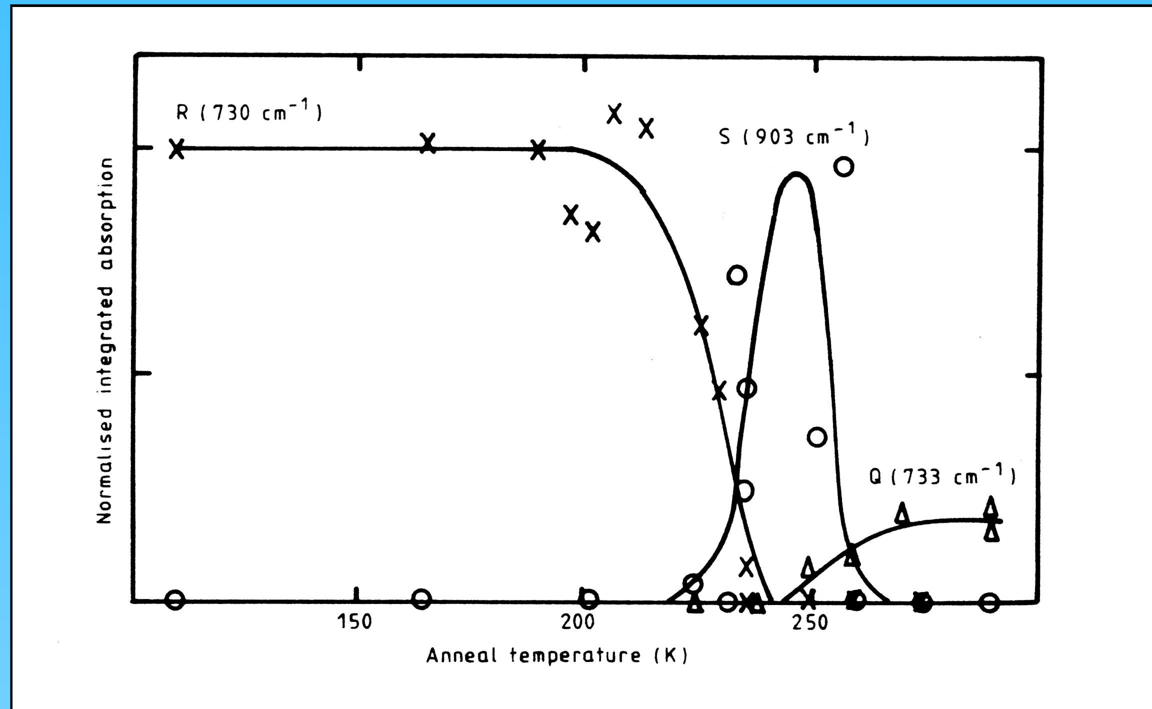

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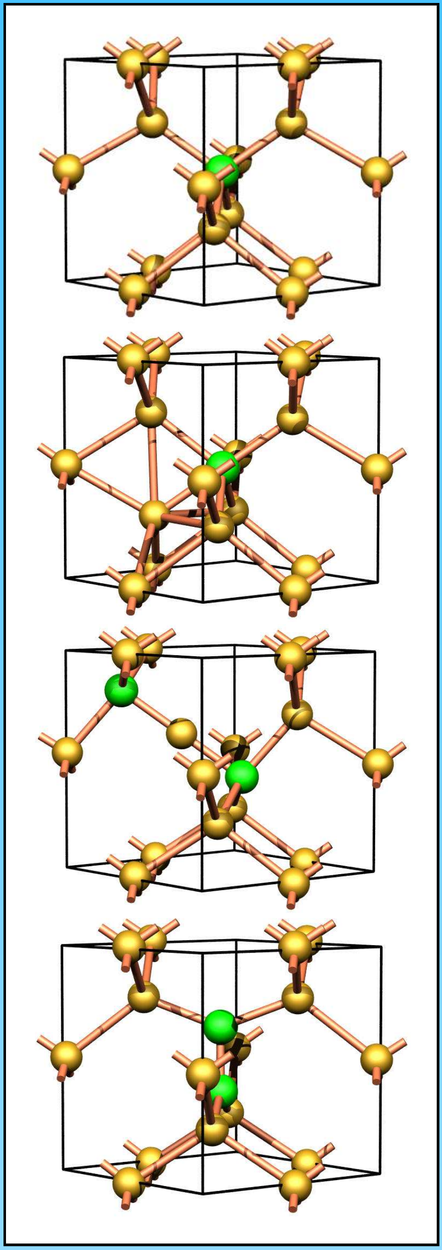

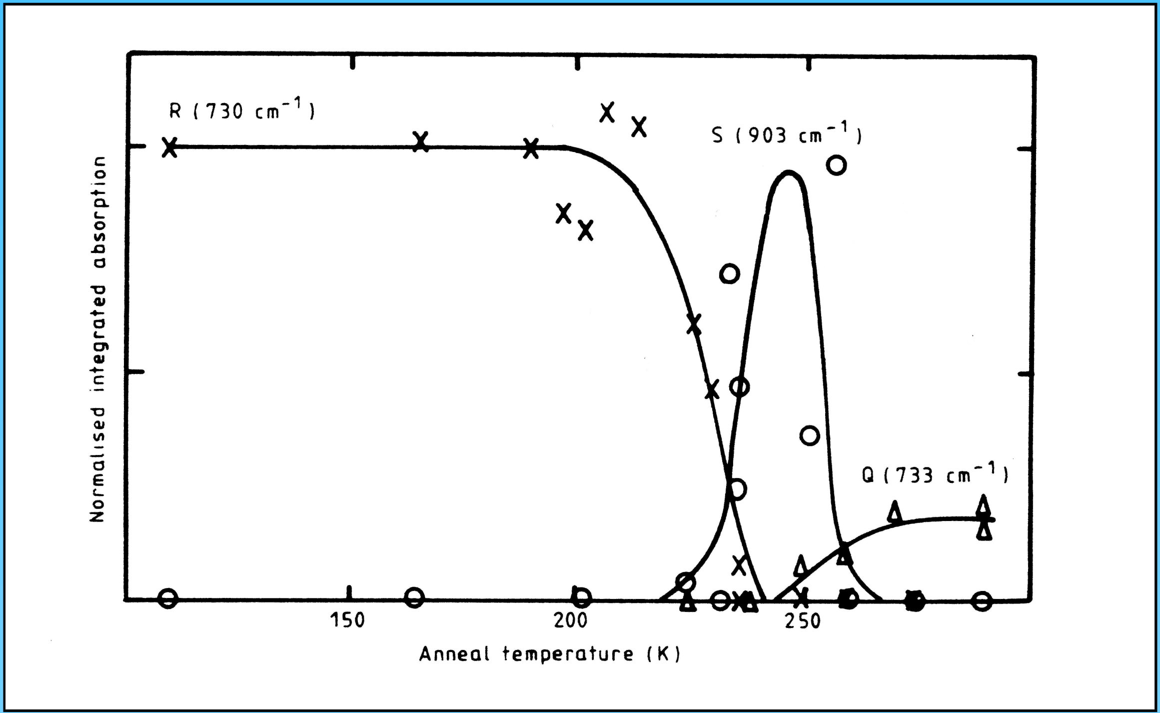

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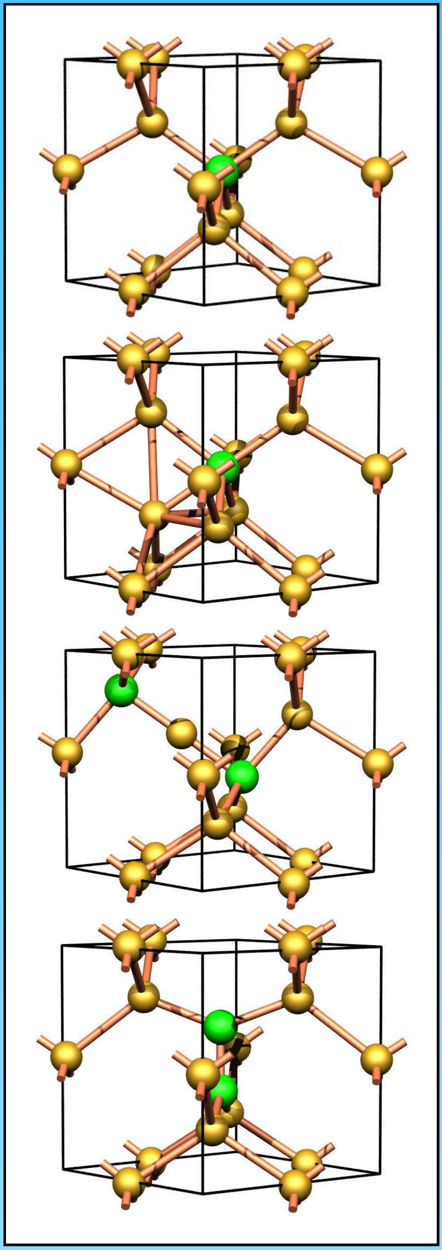

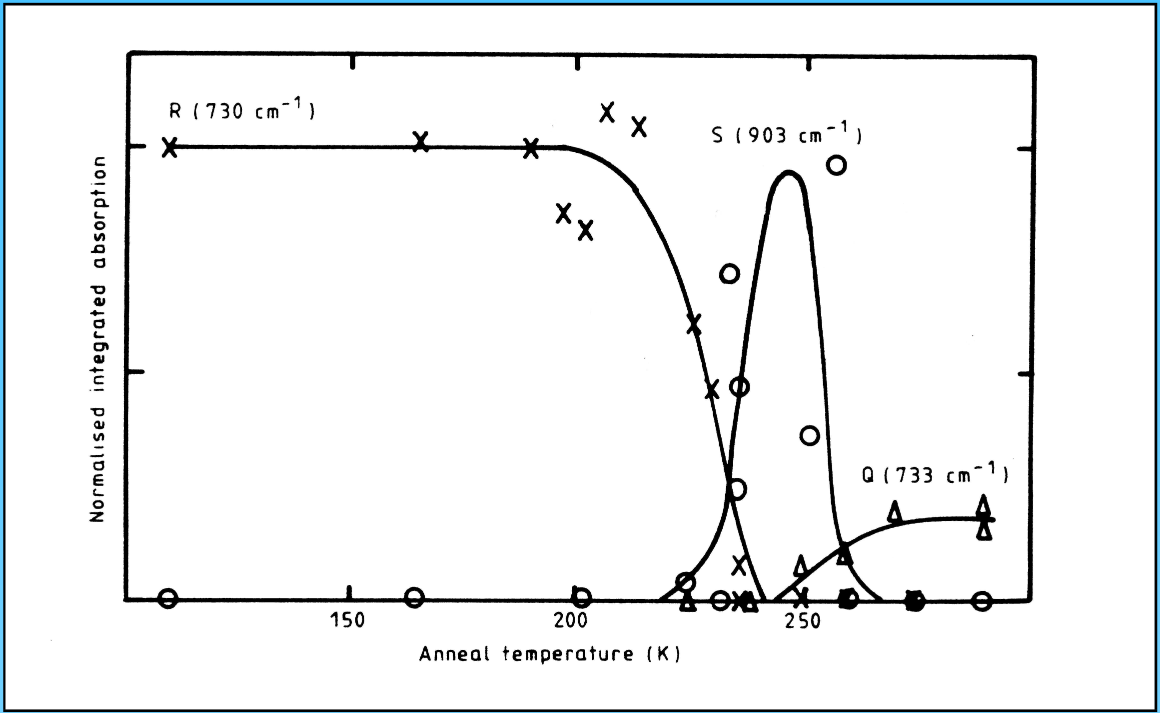

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- B_iB_s is electrically inactive

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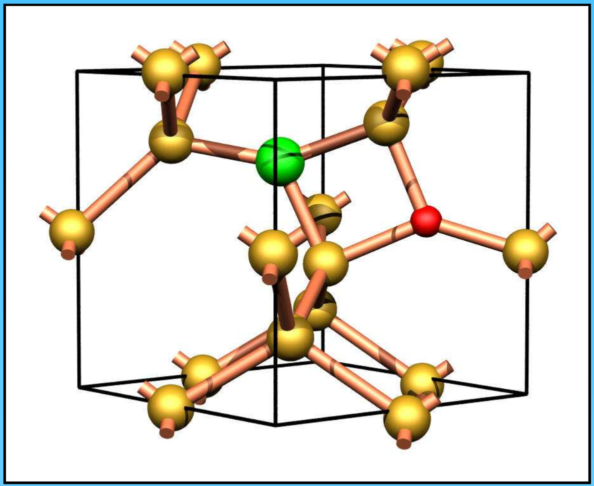

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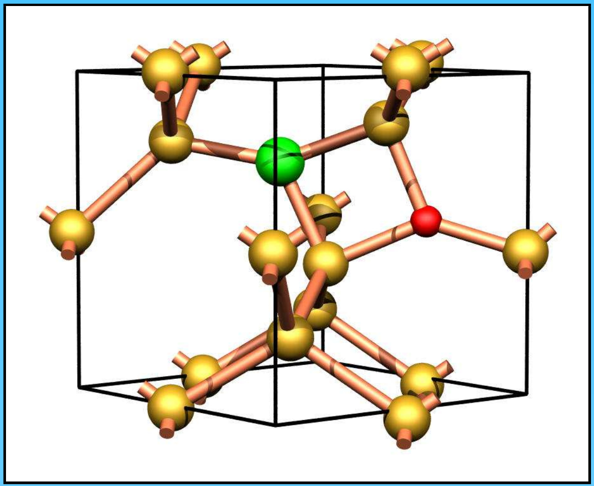

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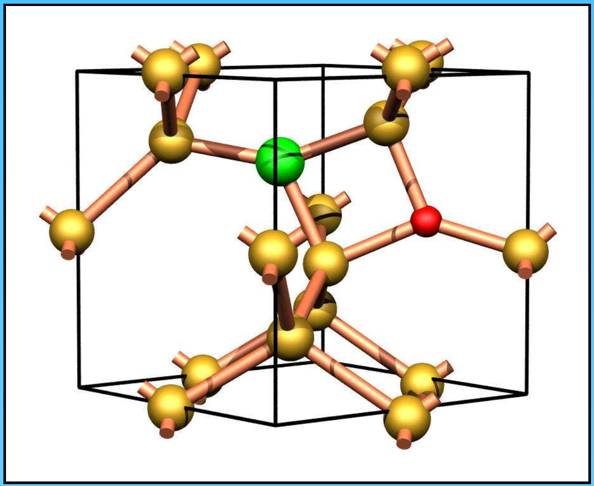

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  - ⋆ $E_A = 1.2$ eV (using experimental W_{B_i})

J. R. Troxell and G. D. Watkins, Phys. Rev. B **22**, 921 (1980).

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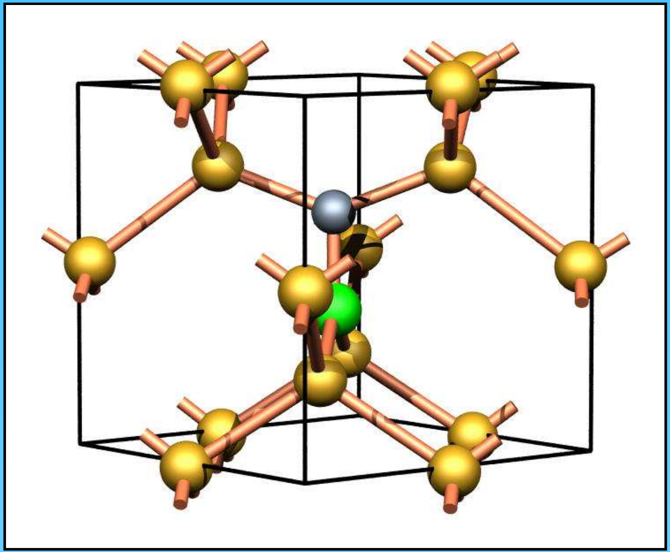

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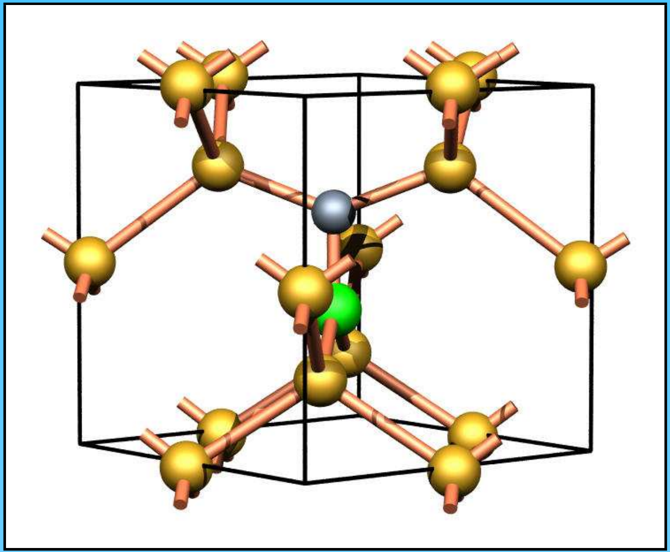

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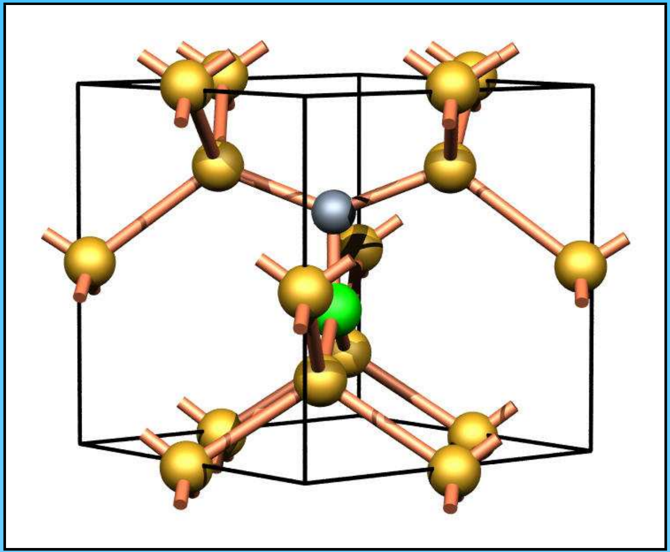

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  - ⋆ $E(0/+) = E_v + 0.24$ eV
  - ⋆ Would dissociate at $\sim 400°$C

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- $\mathsf{E}_v + 0.51$ dominant level in hydrogenated, e-irradiated, p-Si with [B] $=$ (2-20) $\times 10^{15}$ cm^{-3}

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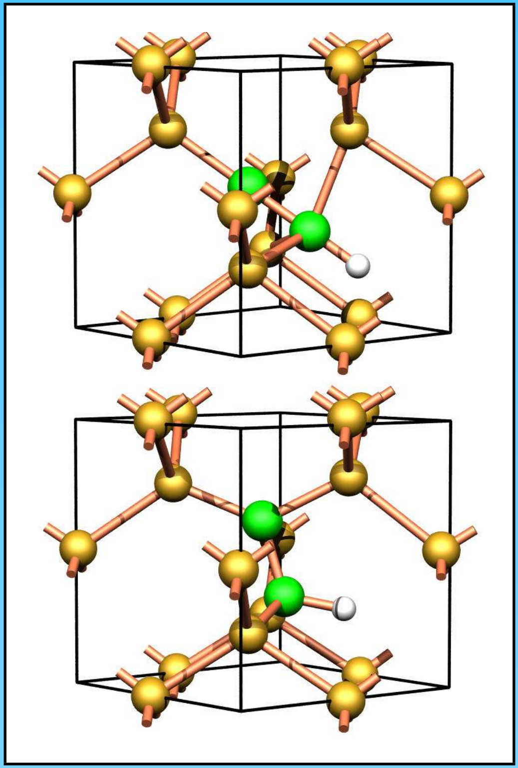

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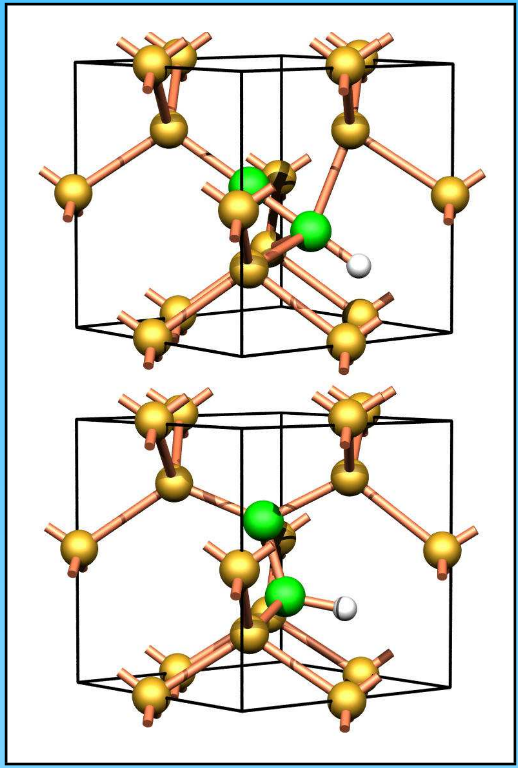

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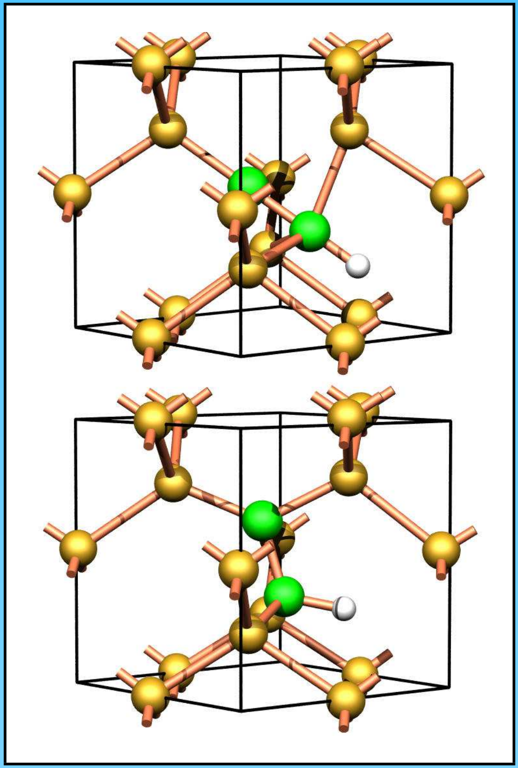

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- B_iO_i would be the dominant interstitial defect in p-type detectors
  - ⋆ $\sigma_n = 10^{-13}$, $\sigma_p \approx 10^{-20}$ cm^2

P. M. Mooney *et al.*, Phys. Rev. B **15**, 3836 (1977).