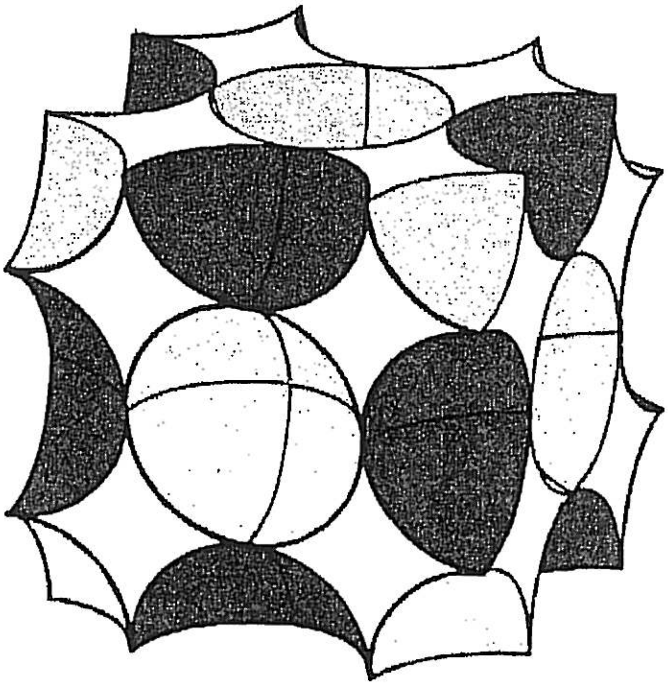

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ELECTRONIC TUNNELLING PROCESSES IN CsI : (Na,Tl)

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Electronic transfers via tunnelling processes occur in a variety of solids. It is the case in particular of the phosphorescence phenomena observed after X-raying at low temperature alkali halides doped with monovalent impurities. In CsI:Na or Tl, we observed such an electronic tunnelling transfer between V_k centers and nearby impurities having trapped an electron, followed by a radiative recombination (phosphorescence at 420 nm (Na^+ perturbed exciton) or 560 nm (Tl^+ emission)). The kinetics have been studied in a high magnetic field ($B \leq 6$ T) in the range $0 \leq B/T \leq 3{,}5$ [T/K]. The time dependence is governed by an hyperbolic law $I(t, B/T = cte) = A(B/T) \cdot t^{-1}$. The function $A(B/T)$ can be calculated assuming a simple spin-dependent transfer model for the pair of defects with a triplet to singlet ratio for the radiative tunnelling recombination probability of about 0,17 for CsI:Na and 1 for CsI:Tl. Similar measurements on other systems, including doped alkaline earth halides are presently under way.

This phosphorescence has been used also to detect electronic resonance at LHeT. A broad, unresolved V_k-like spectrum (about 0.1 % of the total intensity) is visible at wavelengths corresponding to the annihilation of self-trapped excitons perturbed by Na (420 nm) with a polarization parallel to the V_k axis. The signal can be increased by IR stimulation. No effect is found in the band of the intrinsic emission of the self-trapped exciton (290 and 338 nm).