MAGNETO-OPTICS STUDIES OF SELF-TRAPPED EXCITON LUMINESCENCE IN Csl

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Self-trapped exciton (STE) luminescence in Csl occurs at 290 nm and 338 nm. We showed that the occurence of the 2 emission bands can be understood in the framework of a phenomenological theory [1] , the lowest levels of both types of STE being composed of a partially allowed triplet state below a singlet state.

The validity of the model has been further tested by studying both emissions under strong magnetic field (0 < B < 5-5 T) down to T = 1.5 K (B //<100>). Each triplet states split under magnetic field and both emissions detected along it should exhibit a magnetic circular dichroism (MCD}. Experimental results confirm this point of vue. Figs. 1 and 2 show results for the 338 nm emission. The temperature and field behaviour of the MCD is more complicated than was previously shown by Kabler et al. [2]. The maximum P value foreseen by the model is -0.5. The peak observed near B = h.5 T for T < 6 K has been attributed to the crossing of the | ; T^> and ; levels fl] [2] [3] . But neither its maximum value nor the particular behaviour of the MCD at low field can yet be fully explained. Fig. 3 shows results for the 290 nm emission. The maximum P value predicted is also -0.5. No change in the bands shape has been observed. We found that for the 338 nm emission the I+ + I" + I values (normalized to 1 at B = 0) slightly increase with the field for T > 10 K but are strongly reduced for T < 10 K. The opposite behaviour is found for the 290 nm emission for which a slight increase is found for all temperatures.

We also measured the emissions perpendicular to the field axis. Both of them exhibit a partial horizontal polarization (//%); the $(I_h - I_v)$ / $(I_k + I_v)$ values are function of temperature and field and are typically ^0.18 for both bands at B = 5 T and T • 1.6 K. Despite these important intensity variations the total light intensity emitted by the crystal in all directions remains constant at all temperatures for a given magnetic field, but seems to increase slightly as a function of it (^>k%). These observations confirm the model of the transfer from the STE states to ones [1] and indicate that it is magnetic field dependent.

Decay time measurements and model calculation are underway in order to clarify these processes.

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References

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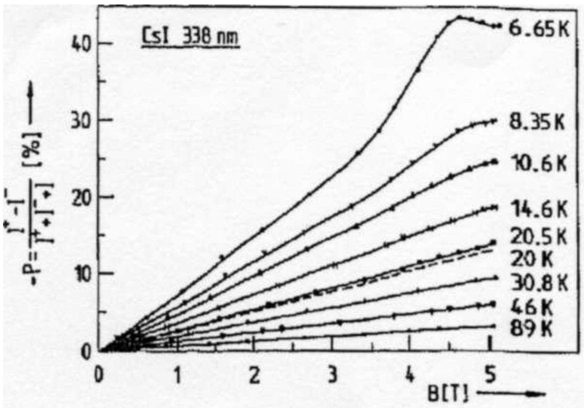


Fig. 1 : MCD of 338 nm emission for T ≥ 6.65 K. Dashed curve is from [2]

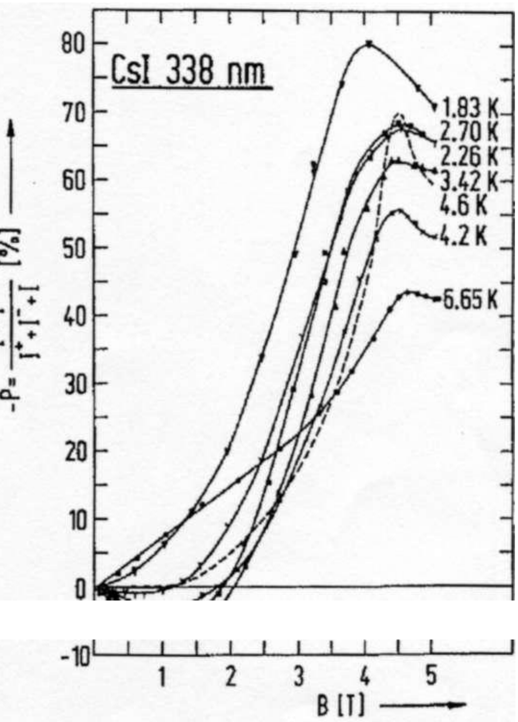
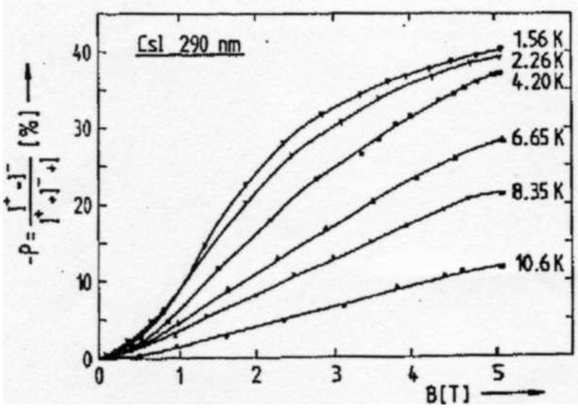


Fig. 2 : MCD of 338 nm emission for T ≤ 6.65 K. Dashed curve is from [2]



Fift. 3 : MCD of 290 nm emission