

# New erbium-doped photonic materials

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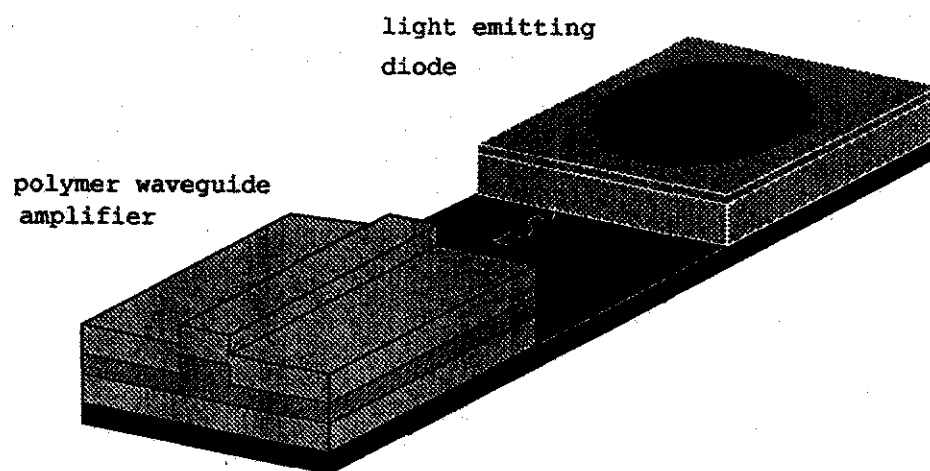
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## Abstract

Erbium-doped organic complexes are synthesized and show room temperature photoluminescence at 1.54  $\mu\text{m}$ . The luminescence lifetimes, and temperature quenching are studied for complexes with different structures, and complexes in which specific H atoms are replaced by D atoms. Coupling of the  $\text{Er}^{3+}$  with nearby C-H and O-H bonds causes quenching of the luminescence. These erbium-doped organic complexes may be used in planar optical waveguide amplifiers operating at 1.54  $\mu\text{m}$ .

Hydrogenated amorphous silicon films, deposited by plasma enhanced chemical vapour deposition are implanted with erbium ions. The 1.54  $\mu\text{m}$  photoluminescence and the effect of post implantation annealing and O co-doping are studied. Erbium implanted p-i-n diodes show room temperature electroluminescence at 1.54  $\mu\text{m}$  under forward bias.



This work was performed at the FOM institute for atomic and molecular physics between September 1995 and September 1996 as part of the graduation program of the study physics at the University of Utrecht.