

Chapter 5

Summary

The research describes the lasing action of C460, R640 and DF doped into poly(vinyl alcohol) (PVA) film on glass slides. The solid-state dye lasers were studied with respect to spectral features, efficiency, photostability, beam characteristics, and input power of the pumping laser system. When pumped by a Transverse Excited nitrogen laser, the solid-state dye lasers produced superradiant emissions at an incident energy threshold of only a few hundred microjoules per pulse. The absorbed input conversion efficiency of DF is the highest (8 ~ 11% with degradation of <15% after 1000 pulses) compared with the efficiencies of C460 (4 ~ 8%) and R640 (6 ~ 10%). The efficiency and stability of the dyes in PVA were higher than those with poly(methyl methacrylate) as host material. However, the absorption of the pumping pulse is low (<50%). The profile of the laser beams depended on regularity of the edges of the glass slides. Two beams were observed for the slides having 'as-cut' edges whereas only one beam was observed for the polished 'as-cut' edges and the frosted edges. At a glass-thickness/film-thickness ratio exceeding 35, the resulting

beam is fully wave-guided. When the three dyes were separately coated onto one frosted edge slide and the thickness ratio maintained above this level, the resulting solid state dye laser produced a three-colour beam.