
We report two methods of producing planar technology waveguides for low threshold laser operation. Ion-implantation can make waveguides in many materials with waveguide laser operation so far observed in YAG, GGG, YAP, LiNbO₃, BGO and glass, doped with Nd³⁺, Yb³⁺, and Tm³⁺. 2D and 3D guides have been fabricated and propagation losses as low as 0.15dB/cm can be obtained. Liquid-phase epitaxial thin film growth has so far produced Nd³⁺ and Yb³⁺ doped YAG, 2D waveguide lasers. Extension to new materials and production of 3D guides is currently under consideration. These guides have losses as low as 0.05dB/cm and have potential both as low threshold longitudinally pumped lasers and high average power side pumped devices.