Abstracts

CO/sub 2/ Laser Annealing of Si/sub 3/N/sub 4/, Nb/sub 2/O/sub 5/, and Ta/sub 2/O/sub 5/ Thin-Film Optical Waveguides to Achieve Scattering Loss Reduction

S. Dutta, H.E. Jackson, J.T. Boyd, R.L. Davis and F.S. Hickernell. "CO/sub 2/ Laser Annealing of Si/sub 3/N/sub 4/, Nb/sub 2/O/sub 5/, and Ta/sub 2/O/sub 5/ Thin-Film Optical Waveguides to Achieve Scattering Loss Reduction." 1982 Transactions on Microwave Theory and Techniques 30.4 (Apr. 1982 [T-MTT] (Joint Special Issue on Optical Guided Wave Technology)): 646-652.

Significant reductions in the optical scattering losses of Si/sub 3/N/sub 4/, Nb/sub 2/O/sub 5/, and Ta/sub 2/O/sub 5/ waveguides fabricated on SiO/sub 2/ /Si substrates have been measured following CO/sub 2/ laser annealing. The largest improvements were observed for Si/sub 3/N/sub 4/ waveguides, where waveguide attenuation values of about 6.0 dB/cm before laser annealing were reduced to as low as 0.1 dB/cm afterwards. An improvement of more than an order of magnitude was obtained for a Nb/sub 2/O/sub 5/ waveguide upon laser annealing, the attenuation coefficient decreasing from 7.4 to 0.6 dB/cm. In the case of one Nb/sub 2/O/sub 5/ waveguide no improvement was obtained upon laser annealing. The attenuation coefficient of a reactively sputtered Ta/sub 2/O/sub 5/ waveguide was found to decrease from 1.3 dB/cm before laser annealing to 0.4 dB/cm afterwards. In the case of a thermally oxidized Ta/sub 2/O/sub 5/ waveguide a small initial improvement in waveguide attenuation was followed by degradation upon further laser annealing.

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