
SiON Waveguide Materials for Microphotonics.

Personnel

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Good waveguide materials must combine low optical loss with the flexibility to fabricate a wide variety of active and passive devices on a single materials platform. With a refractive index tunable between 1.46 and 2.3, silicon oxynitride provides this flexibility. However, current methods used to process silicon oxynitride introduce excessive amounts of hydrogen, increasing the amount of transmission loss, and these methods require very high temperature anneals. Sputter deposition provides an alternative to these traditional deposition methods. Sputter deposition has the potential to produce high quality, low loss silicon oxynitride waveguides with easily controlled refractive indices.

Preliminary studies have shown sputtered silicon oxynitride to be a good potential waveguide material. Low birefringence films have been produced over a wide range of refractive indices by reactive rf sputtering in an oxygen ambient from a silicon nitride target. Figure 28 shows refractive index vs. gas flow rate for a number of films. The refractive index varies linearly with the gas flow rate, making the index easily tunable. Future studies will focus on producing waveguides using these sputtered oxynitrides as core materials.

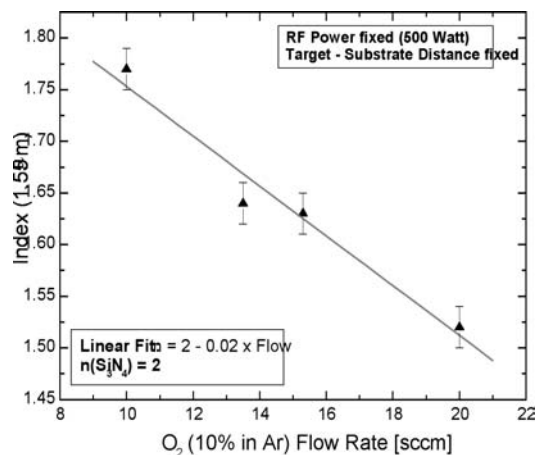


Fig. 28: Refractive index (measured at 1554 nm) vs. gas flow rate for sputtered films.
