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Transmission loss characteristics of silicon nitride waveguides fabricated by liquid source plasma enhanced chemical vapor deposition

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Abstract

Silicon nitride (SiN) thin films were deposited by a cathode coupling-type plasma enhanced chemical vapor deposition (PECVD) using two types of liquid sources, hexamethyldisilazane and trisdimethylaminosilane. The concentration of carbon impurities in the films could be reduced by minimizing the flow rates of these sources. The film deposited from the latter source exhibited the lowest transmission loss of 0.1 dB/cm at 1550 nm in wavelength. The deposition of SiN film from silane was also examined by an anode coupling-type PECVD. However, the scattering loss of the film was higher than those from the liquid sources, which was caused by the surface roughness of the film.

Keywords: Silicon nitride; Waveguides; High index contrast; Chemical vapor deposition