

Cold deposition of zinc sulfide optical waveguides using thermoelectric device

Abstract

Zinc sulfide (ZnS) thin films as the waveguide medium have been deposited onto oxidized silicon wafer substrates at cold temperature ($T_{\text{cold}} = -50^{\circ}\text{C}$) and ambient temperature ($T_{\text{ambient}} = 25^{\circ}\text{C}$) by thermal evaporation technique. The surface morphology of ZnS films were pictured with an atomic force microscopy (AFM) and the surface roughness were calculated from the AFM images. The propagation losses of the samples were measured using a scanning detection technique attached to a prism coupler. The AFM results revealed that the surface of cold deposited ZnS film is rougher than the surface of ambient deposited ZnS film. The propagation losses of the cold deposited ZnS waveguide are consistently lower than the ambient deposited ZnS waveguide at all measured wavelengths.