Effect of nitrogen concentration on the microstructures of AlN thin films fabricated by reactive RF sputtering
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Abstract: Aluminum nitride (AlN) thin films have been deposited on Si substrate by using reactive RF magnetron sputtering method in a gas mixture of Ar and N\textsubscript{2} at different N\textsubscript{2} concentration. It was found that N\textsubscript{2} concentration was varied in the range up to 20-100\%, highly c-axis oriented film can be obtained at 50\% N\textsubscript{2} with full width at half maximum (FWHM) 4.5°. Decrease in surface roughness from 7.5 nm to 4.6 nm found to be associated with decrease in grain size, with N\textsubscript{2} concentration; however, the AlN film fabricated at 20\% N\textsubscript{2} exhibited a granular type of structure with non-uniform grains. The absorption peak was observed around 675 cm\textsuperscript{-1} in fourier transform infrared spectroscopy (FTIR). It is concluded that the AlN film deposited at N\textsubscript{2} concentration of 50\% exhibited the most desirable properties for the application of high-frequency surface acoustic devices.

Key Words: aluminum nitride, c-axis orientation, nitrogen concentration