Photonic gaps of aluminium-nitride film related with structure and deposition

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Abstract

Work is reported on the characterizations of pulsed laser deposited aluminum-nitride thin films. The films were deposited on silicon substrate with a KrF 248 nm pulse laser operating in a Riber LDM-22 system. Optical reflection spectroscopy (400-900 nm) was carried out, which revealed that, under certain deposition conditions, the films could show strong periodic spectra with reflection gaps of about 50-100 nm in width. The microscopic structures, such as crystalline status and element composition, were also investigated with Auger electron spectroscopy, X-ray photoelectron spectroscopy, atomic force microscopy, scanning electron microscopy, and profilometry etc. Relations between the optical responses and the microscopic structures were established. The foundations underlying the relations were studied and discussed.

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