

Plasma Enhanced Chemical Vapor Deposition of PLASMA AlN Nanolayers

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In this paper we investigated PECVD AlN nano-layers prepared by NH₃ plasma treatment of thin Al films deposited on silicon substrate. These results are compared with those, when AlN thin films were obtained by means of Rapid Thermal Annealing (RTA) of Al in ammonia atmosphere. Al-N bound was founded after the RTA process. The structure and the morphology of the films were investigated before and after the annealing. The subsequent RTA process of these structures promotes the Al diffusion from the bulk to the surface, while at temperatures 800-1000oC - additional chemical bonds between the aluminum and the nitrogen appears. This is evidenced by the EDX microprobe analysis. It is possible also, that a process of diffusion of trapped nitrogen atoms in interstitials occurs from surface to the bulk. According to the resistance measurements, best results are obtained when AlN films are deposited by PECVD followed by annealing at 1000oC for 15 seconds. The Rapid Thermal Annealing is very effective process when thin (3-7 nm) AlN nanolayers are considered, since for thicker AlN structure, PECVD gives better results. A correlation was established between the parameters of the layers and the method of preparation.

Keywords: PECVD, AlN, Rapid Thermal Annealing