

## **Effects of Sputtering power and target-substrate distance on the microstructures of AlN thin films fabricated by reactive RF sputtering**

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Aluminum nitride (AlN) has shown great potential for high-frequency surface acoustic wave devices and it is important to control the preferred orientation of the crystal structure with deposition parameters. AlN thin films have been deposited on Si substrate by using reactive RF magnetron sputtering method in a gas mixture of Ar and N<sub>2</sub>. The effects of the sputtering power and distance (D) from the target to the substrate on the preferential orientation of the AlN films are studied. The results show that a higher sputtering power and shorter distance D are conducive to the formation of the (002) plane. On the contrary, a lower sputtering power and longer distance D are beneficial for the growth of the (100) plane. Moreover, the preferential orientation of the AlN thin film is also deal with from the viewpoint of the formation of the Al-N chemical bond, the ion bombardment and the mean free path of sputtered particles.