

# UNH Materials Science Seminar

11:00-12:00, Thursday, November 2, 2006

DeMeritt Hall 209B

University of New Hampshire

## Tilted Fiber Texture in Aluminum Nitride Thin Films

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We report a strong dependence of fiber texture tilt angle on the angle of deposition and gas composition in aluminum nitride (AlN) thin films prepared by reactive magnetron sputtering in N<sub>2</sub>/Ar mixtures. Texture distributions were measured using x-ray pole figures. For fully nitrided films, deposited with N<sub>2</sub> flow of 15% of the total flow, the AlN c-axis fiber tilt angle increases steadily with deposition angle, with the c-axis approximately aligned with the deposition direction. We measured the c-axis AlN tilt angle as a function of N<sub>2</sub> flow for a deposition angle of 42° from normal, and found that the c-axis remains perpendicular to the substrate for a N<sub>2</sub> flow ratio up to 12%, and then abruptly shifts towards the deposition direction for a N<sub>2</sub> flow ratio above 12%. We also identified a range of deposition parameters at lower N<sub>2</sub> flow in which an amorphous phase of AlN is formed. We attribute the tilted fiber texture to the energetic atom flux causing less damage to grains oriented with open channeling directions, compared with non-channeling directions, in AlN.