

Supplemental material for abstract id 1257:

"Zero temperature coefficient of resistance in BEOL- compatible titanium-aluminum nitride ternary nanolaminates grown by ALD"

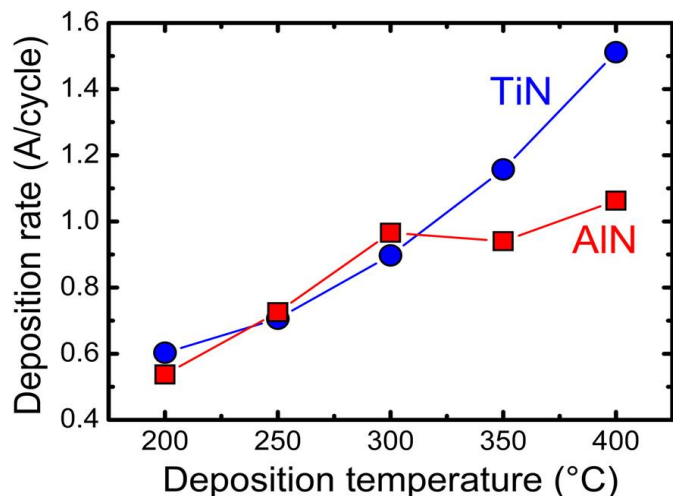


FIG. 1. Deposition rate of TiN and AlN with varying deposition temperatures.

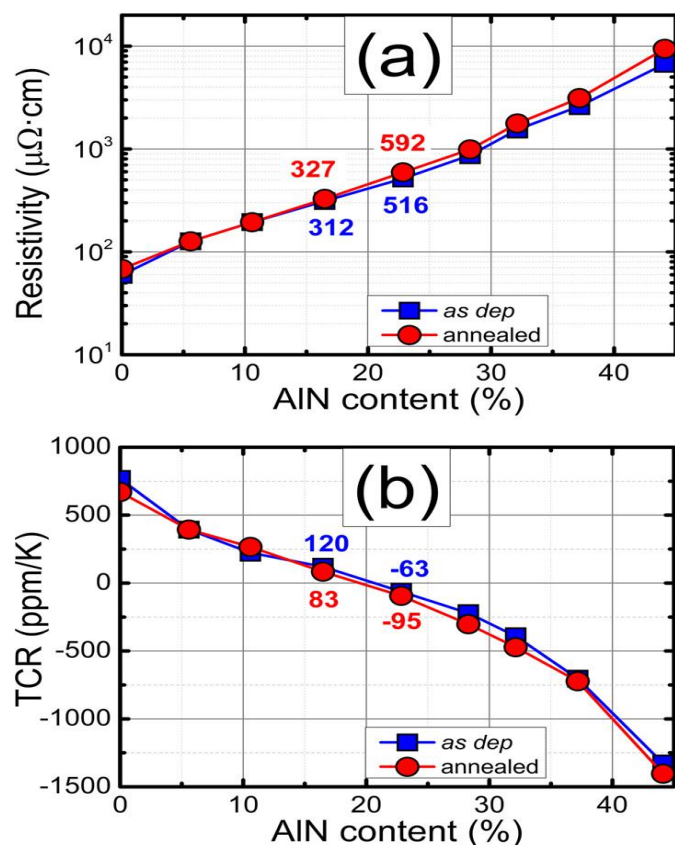


FIG. 2. (a) Measured electrical resistivity at room temperature and (b) TCR vs. AlN content in $Ti_xAl_{1-x}N$ films before and after annealing (at 500 °C during 1 hr in vacuum). The TCR is measured in the range from -40 °C to +100 °C. Resistivity and TCR values of films near the zero TCR crossing are noted.

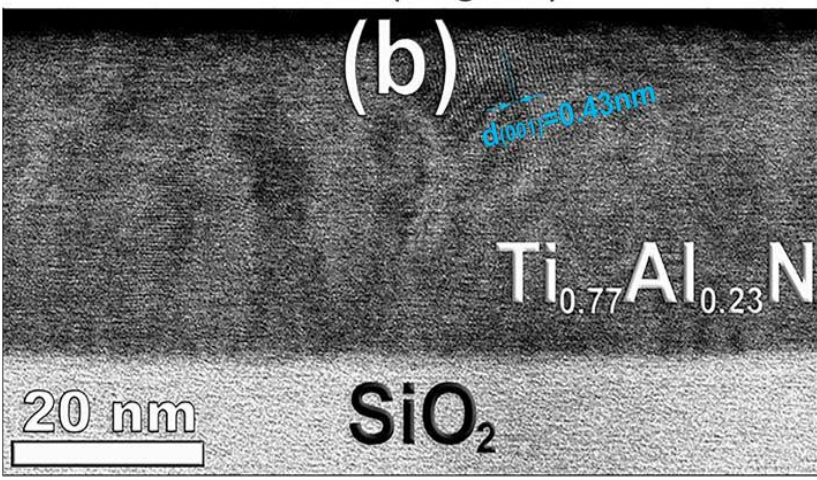
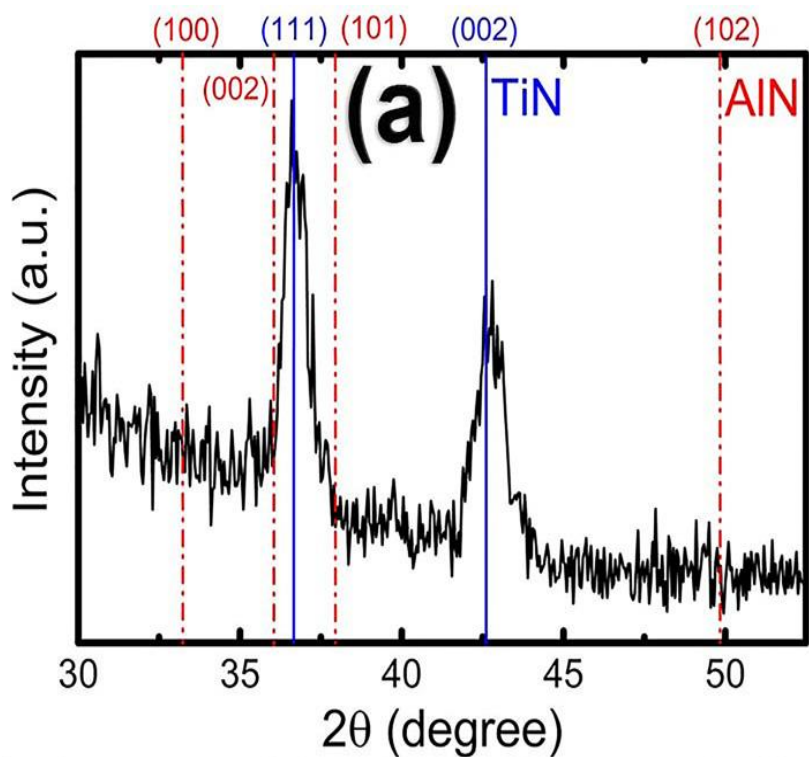


FIG. 3. (a) XRD spectra and (b) BF STEM micrograph of the 32 nm thick $Ti_{0.77}Al_{0.23}N$ film as deposited on the $SiO_2(100\text{ nm})/Si$ substrate. The XRD spectra of the nano-laminate show TiN-related peaks but no AlN-related peaks. The BFSTEM image shows dark-contrast grains in the bright contrast matrix. The lattice fringes of TiN crystals are observed. These findings suggest the presence of TiN crystallites in the $Ti_yAl_{1-y}N$ matrix.