

## ABSTRACT

Chromium nitride and titanium nitride (CrN-TiN) thin films were deposited as successive, alternating layers on Si(100) substrates using a Closed Field Unbalanced Reactive Magnetron Sputtering method (CF-UBRMS) at various substrate biases ( $V_b$ ) and deposition times  $t$ . Electron microscopic study of cross-sectional samples reveals that the structural properties of the films depend on the growing conditions.

The multilayer character was partially observed in all three films. In the case of  $V_b = V_{\text{floating}} = +24V$  and  $t=10\text{min}$ , multilayers are shown only at the first 50nm while the rest of the film consists of columnar nanocrystals. In the case of  $V_b = -50V$  and  $t=10\text{min}$  the multilayer character was observed at the first 120nm even inside the columnar crystals that are formed from the base up to the surface of the film. For  $V_b = V_{\text{floating}}$  and  $t=5\text{min}$ , also two zones are observed. Multilayers are present only at the second zone.

High resolution electron microscopy (HREM) images show that the films are polycrystalline. Very often, in the nanocrystals, the alternating layers of the two nitrides are grown epitaxially one to the other, but with no preferred orientation regarding to the substrate. Moreover, in certain cases no difference between the lattice parameters of the layers was observed, denoting that the layers are under stress.