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Structure and properties of transition metal nitride films: from ScN to Cu₃NJean-François Pierson¹, Fabien CAPON²¹Institut Jean Lamour - Dpt CP2S, NANCY, France ²Institut Jean Lamour, Nancy, France

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Due to their mechanical and optical properties, transition metal nitride (TMN) films are widely used in industry. Within the first row of the transition metals, titanium and chromium nitride films have been extensively studied. However, the literature reports little information about other nitride such as: ScN, FeN, Ni₂N, Cu₃N... This presentation aims to compare the properties of several nitrides deposited in the same reactor, on the same substrate and with the same thickness (1 μm).

Transition metal nitride films were deposited on glass substrates by pulsed DC reactive magnetron sputtering of metallic targets. The deposition time was adjusted to deposit 1 μm-thick films. The film structure was studied by X-ray diffraction and the film morphology was observed by scanning electron microscopy. Electrical and optical properties were investigated using the four point probe method and the UV-visible-NIR spectrophotometry, respectively.

Whatever the transition metal, nitride films are crystallised. The grain size estimated using the Scherrer law was correlated to thermodynamical properties of the compounds. Optical and electrical measurements showed that most of the nitride exhibit metallic properties, only ScN and Cu₃N are semiconducting materials.

Keywords

Nitride

Structure

Electrical conductivity

Optical properties