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COMPARISON OF THE PROPERTIES OF TiN AND CrN COATINGS SYNTHESISED BY REACTIVE ARC EVAPORATION AND HIGH POWER IMPULSED MAGNETRON SPUTTERINGFrédéric Lapostolle¹, Amélie Guillaumot¹, Jean François Pierson², David Pilloud², Alain Billard¹¹LERMPS UTBM, Belfort, France ²IJL, Nancy, France

frederic.lapostolle@free.fr

The developments of physical vapour deposition processes can be an alternative to enhance thin films properties. Some years ago, several researchers showed a great interest in the use of highly ionised plasmas provided by cathodic arc evaporation, which is now extensively developed at industrial level. More recently, High Power Impulse Magnetron Sputtering (HIPIMS) should be an alternative between arc evaporation and conventional DC sputtering. This new technology of power supplies also allows enhanced plasma densities with a high degree of ionisation of the sputtered particles. This allows the possibility to control the ion bombardment on the surface of the substrates. Then, film density and adhesion should be enhanced by applying a negative bias voltage to the substrates.

In this paper we propose to compare arc evaporation and HIPIMS processes by developing and characterising well known coatings such as TiN and CrN. In all cases, thin films are synthesised from pure metallic target in an Ar-N₂ atmosphere. The influence of the process used and of the substrate bias voltage is investigated in relation to the chemical, structural, morphological and mechanical features of the layers.

Keywords

Arc evaporation

HIPIMS

CrN

TiN

mechanical properties