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Influence of aluminum sputtering rate on mechanical and tribological properties of CrAlN coatingsKHALIL AOUADI¹, Corinne NOUVEAU², Aurélien BESNARD², Brahim TLILI³, Moez CHAFRA⁴

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As it is well known, the application of hard coatings is widely used to improve mechanical and tribological properties of cutting tools. Meanwhile, the application of such coatings on wood cutting tools is still limited. Our work consisted in studying a series of CrAlN coatings deposited on silicon and 90CrMoV8 stainless steel substrates by DC magnetron sputtering. The influence of the aluminum content in the layers is obvious on their structure, morphology and mechanical or tribological properties. The increase of the aluminum content up to 11% in the layers permitted to increase their wear resistance while it decreased for higher contents. Besides, the friction coefficient of the CrAlN coatings decreased as the Al content increased. SEM and AFM observations showed that the CrAlN ternary systems presented a dense and compact microstructure. Finally, the addition of aluminum to a binary system (Cr-N) improved its corrosion resistance. Indeed, the CrAlN layers showed a better corrosion behavior in comparison to the CrN binary layers.

Keywords

CrAlN

magnetron sputtering

corrosion

tribological properties