

Microstructure

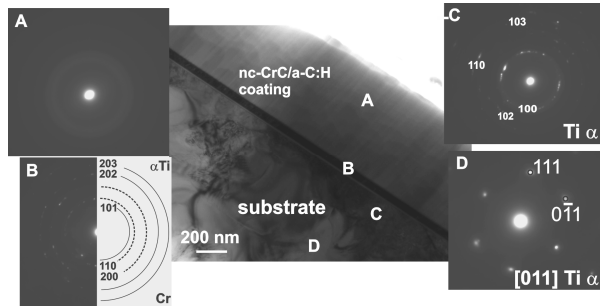


Fig. 7. Microstructure of the nc-CrC/a-C:H coating on oxygen hardened Ti-6Al-4V alloy as well as SAED patterns taken from the areas A-D marked in the figure and their identification; TEM cross-section thin foil.

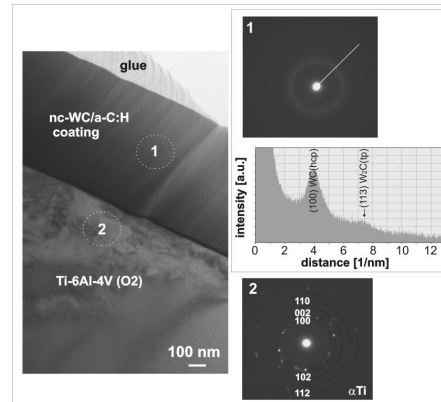


Fig. 8. Microstructure of the nc-WC/a-C:H coating on oxygen hardened Ti-6Al-4V alloy as well as SAED patterns taken from the areas marked on the figure and their identification; an intensity profile of the SAED patterns taken from the coatings are presented; TEM cross-section thin foil.

Conclusions

Obtained nc-CrC/a-C:H and WC/a-C:H coatings have very good adhesion also to bulk hardened and tempered steel substrates and to diffusion hardened Ti6Al4V alloy. Mean values of friction coefficients between coatings on steel substrates and hardened titanium alloy was 0.08 for nc-CrC/a-C:H and 0.1 for nc-WC/a-C:H. This is a very good result and in connection with good quality of adhesion to those substrates, allows to use low friction nanocomposite coatings based on amorphous matrix and nanocrystalites of transition metals to enhance tribological properties of elements made of steel or titanium alloys working as friction couples in temperatures up to 200 °C. Especially in aviation and car industry as parts of engines and power transmissions and as a coating on machining tools, also for hard-to-machining materials like Ni, Ti and Co. In spite of low values of hardness and Young modules the coatings have very good wear resistant which are most important for low friction coatings than mechanical properties.

Corrosion properties of nanocomposite coatings mainly depend on the substrate material. In the case of steel Vanadis 23 coatings caused a significant increase of corrosion resistance, even after 48 hours in a chloride solution.

However, in the case of titanium alloy tested coatings also increased corrosion resistance. However, this increase was not as significant as in the case of steel Vanadis 23.

References

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