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TRIB-P2-176 • Influence of temperature on the properties of W-Ti-B coatings deposited with the HiPIMS method

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This paper presents the properties of (W,Ti)B₂ films deposited by high-power pulsed magnetron sputtering. Studies have shown that it is possible to obtain the α-(W,Ti)B₂ crystal structure even at a substrate temperature of 300 °C. The (W,Ti)B₂ coatings applied by HiPIMS have very interesting mechanical properties. At the same time, they are super hard (H>40 GP) and flexible [1]. XRD and nanoindentation studies have also shown that such coatings are stable at elevated temperatures. After continuous annealing (1 h at 800°C) and after 50 thermal cycles at a maximum temperature of 600°C, the coatings are still super hard fig.1. Tungsten-titanium diboride films have high thermal stability to 800°C in vacuum (invariance of the crystal phases), and it can withstand oxidation in 450°C.

Fig. 1. Load-displacement curves of (W,Ti)B₂ coatings: a) as deposited (solid line) and after an hour vacuum annealing at 800°C (dashed line), b) after 50 shocks (dotted line)

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References

[1] J. Musil, "Flexible hard nanocomposite coatings," RSC Advances 5(74), pp. 60482-60495, 2015

