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Deposition of γ-alumina by HPPMS in an industrial coating unit

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In our presentation we describe the deposition of γ-alumina deposited by reactive High Power Pulsed Magnetron Sputtering (HPPMS) onto cemented carbide (WC/Co) and steel substrates. We show the potential of HPPMS with respect to the avoidance of both, insulating films on the target surface and hysteresis effects that would require a complex control of oxygen in dependence of the cathode voltage. Film deposition was performed by using Al targets in an Ar/O_2 atmosphere at a temperature of 450 - 500°C and a total pressure of 310 mPa. Peak power densities up to 240 kW were applied to the sputtering cathode.
The coating properties were investigated by means of X-ray diffraction, energy dispersive X-ray microanalysis (EDS) and nanoindentation. Good coating adhesion on the substrate was determined by applying the Rockwell test. The analysis results clearly show that with HPPMS it is possible to deposit γ-crystalline Al_2O_3 at temperatures below 500°C. By choosing the appropriate pulse parameters back sputtering was suppressed and therefore high deposition rates of more than 2.5 µm/h were obtained.

Keywords
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