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Deposition of AlTiN Thin Films onto Additive Manufactured Parts in Ti6Al4V Alloy

Carlo Alberto Biffi^a, Simone Battiston^b, Francesco Montagner^b, Alessandro Fiorese^c, Andrea Gionda^c,
Valentina Zin^b, Jacopo Fiocchi^a and Ausonio Tuissi^a

^a CNR-ICMATE, Unit of Lecco, Via Previati, 1/E, 23900 Lecco, Italy

^b CNR-ICMATE, C.so Stati Uniti, 4, 35127 Padova, Italy

^c TAV VACUUM FURNACES SpA, Via dell'Industria, 11, 24043 Caravaggio (BG), Italy

simone.battiston@cnr.it

This work reports the preliminary results of AlTiN hard coating deposition process carried out via reactive Physical Vapor Deposition High-Power Impulse Magnetron Sputtering (PVD HiPIMS), with the aim of improving the surface features of Ti6Al4V substrates, realized via Selective Laser Melting (SLM). Additive manufacturing (AM) is a bottom-up technology that could be the answer to particular needs, supporting the rapid fabrication of components with complex shapes. The choice of Ti-6Al-4V alloy is justified by the spread use of this alloy in several fields, such as the biomedical and aerospace ones [1]. On the other hand, AlTiN based hard films are widely used in many industrial applications (such as cutting tools, aero-engine sector, bio-implants, etc.) for their excellent wear and corrosion resistance properties up to 900°C [2–6]. In particular, two different SLM process conditions were employed for modifying the obtained part surface morphology and, later, the samples were heat treated in high vacuum. The conditions of the deposition process were adjusted in order to optimize the matching between the metallic substrate and the ceramic coating (Fig. 1).



Fig. 1: AlTiN coating onto Ti6Al4V disk realized by SLM.

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