

Cold-spray of aluminium with and without ceramic combined with plasma electrolytic oxidation

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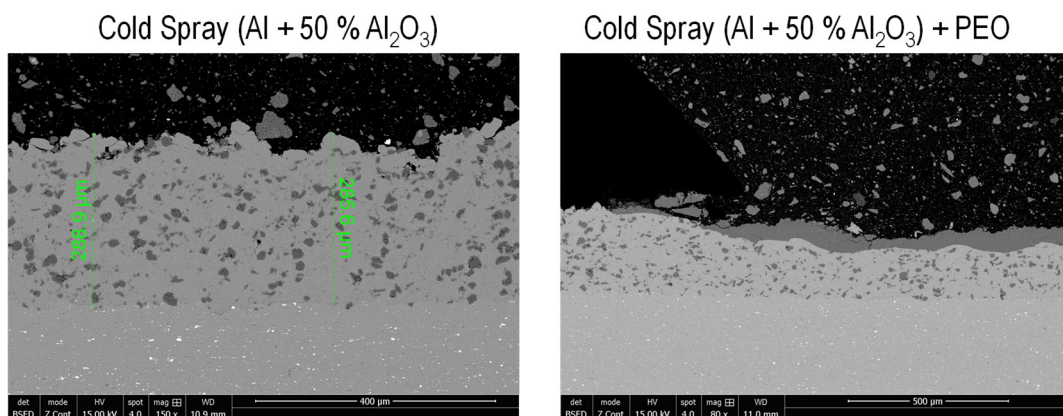
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Oral presentation

Poster presentation

ABSTRACT

Cold spraying is developing rapidly and has a wide spectrum of applications: protection against corrosion, preparation of high conductivity coatings, repair of damaged metal components, metal additive manufacturing, thermal management. Plasma electrolytic oxidation (PEO) is widely used to improve the corrosion and wear resistance of lightweight metals such as aluminum alloys by the formation of a ceramic oxide layer. When applied on aluminium alloys, the PEO oxide layer is mainly composed with γ -Al₂O₃ (in major proportion) and corundum, α -Al₂O₃. Increasing the proportion of corundum is an objective in order to improve the corrosion and wear resistance properties. For this purpose, a duplex treatment combining cold spray and PEO is investigate [1]. Particularly it consists in firstly cold spraying an aluminium coating containing a certain amount of α -Al₂O₃ which is then PEO processed. Our results show that, while the projected alpha alumina particles are observable on cross sections of untreated samples and for short PEO treatment times (lower than 20 min), this is no longer the case for long PEO treatment times (over than 35 min) (see the figure). In fact, under these conditions, it is no longer possible to observe the alpha alumina particles in the PEO layer. More interesting still, the proportion of alpha alumina in the layers resulting from a duplex treatment is greater than that obtained in the layer resulting from a cold spray treatment by scanning electron microscope.



[1] "Duplex surface treatment of metallic alloys combining cold-spray and plasma electrolytic oxidation technologies", martin et al. Surf. Coat. Technol. 392, 125756 (2020)