

Hard anodizing of aerospace AA7075-T6 aluminum alloy for improving surface properties

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ABSTRACT

In the current research work undertaken, an oxide film was grown by performing hard anodizing process on a pure aluminum layer deposited by PVD magnetron sputtering process on AA7075-T6 alloy. The corresponding tribo-mechanical properties were evaluated and compared with those of the base alloy. The dry sliding wear experiments were carried out to investigate wear resistance of anodized AA7075-T6 against the AISI SS316 counter-body by means of a reciprocating tribo-testing setup. The hardness of AA7075-T6 after the anodizing process exhibited an enhancement of about 1.94 times. Results revealed that the wear of anodized coating was exceptionally less when compared with the substrate. Based on morphology and chemistry changes of worn-out surfaces and debris, it was determined that severe abrasive and oxidative wear was the primary wear mechanism for AA7075-T6. The anodizing process increased the friction coefficient from 0.33 to 0.46 but reduced the wear severity by altering the wear mechanism into mild polishing and abrasion. Anodizing enhanced the wear resistance of AA7075-T6 to about three times, and the wear rate decreased to around 4.3 times.

KEYWORDS

Anodizing; Wear resistance; Tribology; Hardness; AA7075-T6 alloy

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