

Accepted Manuscript

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PII: S0257-8972(17)30260-8
DOI: doi: [10.1016/j.surfcoat.2017.03.021](https://doi.org/10.1016/j.surfcoat.2017.03.021)
Reference: SCT 22190
To appear in: *Surface & Coatings Technology*
Received date: 5 December 2016
Revised date: 7 March 2017
Accepted date: 9 March 2017

Please cite this article as: Qingbiao Li, Wenbin Yang, Cancan Liu, Daoai Wang, Jun Liang, Correlations between the growth mechanism and properties of micro-arc oxidation coatings on titanium alloy: Effects of electrolytes. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), doi: [10.1016/j.surfcoat.2017.03.021](https://doi.org/10.1016/j.surfcoat.2017.03.021)

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Correlations between the growth mechanism and properties of micro-arc oxidation coatings on titanium alloy: Effects of electrolytes

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Abstract

In this work, the correlations between the growth mechanism and properties of micro-arc oxidation (MAO) coatings on titanium (Ti) alloy were studied using different electrolytes. The adhesion and tribological properties of MAO coatings were evaluated by thermal shock tests and ball-on-disc friction tests, respectively. Results show that the growth mechanism as well as adhesion and tribological properties of MAO coatings are greatly influenced by electrolytes. In silicate electrolyte, the growth of MAO coatings is dominated by the deposition of silicate oxides and mostly characterized by outward growth. As a result, the coatings exhibit poor adhesion, but the presence of silicate oxides in the coatings is beneficial for improving the wear resistance. In phosphate electrolyte, the coating growth mainly results from the oxidation of the substrate and is more characterized by inward growth, resulting in high adhesion but low wear resistance. Employing the mixed

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