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Zhenwei Li, Shichun Di



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Preparation and properties of micro-arc oxidation self-lubricating
composite coatings containing paraffin

Zhenwei Li*, Shichun Di

School of Mechatronics Engineering, Harbin Institute of Technology,
Harbin 150001, PR China

School of Mechatronics Engineering, Harbin Institute of Technology, Harbin 150001, China.

* Corresponding author, email lizhenweizaizheli@163.com

ABSTRACT

Micro-arc oxidation coatings were prepared on 2024 aluminium alloy using a pulsed bipolar power supply at different cathode pulse-widths. The MAO ceramic coatings contained many crater-like micro-pores and a small number of micro-cracks. After the MAO coatings were formed, the coated samples were immersed in molten paraffin. These micro-pores and micro-cracks on the surface of MAO ceramic coatings were filled with molten paraffin to prepare micro-arc oxidation self-lubricating composite coatings containing paraffin. The microstructure and properties of the MAO coatings and the wear resistance of micro-arc oxidation self-lubricating composite coatings were analysed by SEM, laser confocal microscope, XRD, a Vickers hardness tester, scratch test and ball-on-disc abrasive tests. The results revealed that the wear rates of the MAO coatings decreased significantly with increased cathode pulse-width. The friction coefficient of MAO self-lubricating composite coatings increased with the increase in cathode pulse-width. The wear rates of MAO self-lubricating composite coatings first decreased and then increased with increased cathode pulse-width. Compared to the MAO coatings, the micro-arc oxidation self-lubricating composite coatings exhibited a lower friction coefficient and lower wear rates.

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