Laser composite micro-arc oxidation of light alloys

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Abstract Laser composite micro-arc oxidation technology is the use of laser and micro-arc oxidation technology coupling, can achieve high quality and high efficiency processing of the surface, oriented to the aerospace, aviation, navigation and medical and other fields of high-end equipment light alloy parts of the surface modification needs, in recent years has been rapid development. According to the composite mode can be divided into process composite and energy field composite two categories. The composite of laser and electrochemical processing combines the advantages of both, on the one hand, it can break through the limitations of a single process in environmental protection, efficiency, quality and performance improvement, on the other hand, it can use laser irradiation to produce heat, force and photoelectric effect to change the thermodynamic kinetic characteristics of the electrode surface electrochemical reaction, to achieve the regulation of the electrochemical reaction process. Based on the above, this work reviews the typical types of laser composite micro-arc oxidation technology, methods and principles, and at the same time, combined with the work carried out to introduce the group in the laser composite micro-arc oxidation technology, including laser additive manufacturing alloy micro-arc oxidation, laser surface-strengthened composite micro-arc oxidation and laser synchronous composite micro-arc oxidation technology on the relevant research results achieved. Finally, the future development trend and challenges of the laser composite electrochemical surface manufacturing technology are outlooked from the aspects of efficiency, quality, performance and equipment development.

Keywords Light alloy; Laser processing; Micro-arc oxidation; Composite process

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