Short Communication

Laser cladding in-situ nano-submicron TiC reinforced ultrafine-grained Fe-based composite layers on 42CrMo steel

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In-situ nano-submicron TiC reinforced ultrafine-grained Fe-based cladding layers were prepared by laser cladding gradient particle sizes of ferrotitanium, graphite, and iron powder on the surface of 42CrMo steel. Microstructures and corrosion resistance were analyzed using X-ray diffraction, scanning electron microscope, and an electrochemical workstation. Results showed that the average particle size of the in-situ TiC was 0.25 μm , and ranged from 0.04 μm to 1.10 μm , with 11.0 % being on the nano scale. The microstructure of the cladding layer was lath martensite, and the average grain size of the cladding layer matrix was 4.08 μm , reaching the ultrafine-grained scale. The average hardness of the cladding layer was approximately 720 HV0.2, which was 425 HV0.2 higher than that of the 42CrMo steel. The corrosion current density of the cladding layer was more than two times lower than that of the 42CrMo steel.

Keywords: laser cladding; ultrafine-grained; nano-submicron; TiC

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