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The effect of Ti addition on the microstructure and properties of high chromium iron-based coatings

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Abstract: In this study, the coatings was fabricated on the 3Cr13 stainless steel substrate by laser cladding, and the high chromium iron-based powder mixed with different Ti content was used in the process. The effects of Ti additions on the microstructure, phase compositions, micro-hardness and corrosion resistance of the cladding layer were investigated systematically. The standard Gibbs free energy variation, phase composition, precipitation sequence and the two-dimensional lattice misfit were precisely calculated. The results show that the addition of titanium can not only changes the microstructure of the cladding layer, there is no difference in the phase composition of the coatings. However, there is a great change in the content of individual phase. but also reduces the thermal stress and prevents the occurrence of hot cracks. Due to the different temperature gradients, the microstructure near the fusion zone is mainly composed of flat crystals, cellular crystals and dendrites. The

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