

FINITE ELEMENT ANALYSIS USING MATLAB OF OXIDATION KINETICS IN AIR OF STEEL-T21 ALLOY COATED BY SIMULTANEOUS GERMANIUM-DOPED ALUMINIZING-SILICONIZING PROCESS

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Abstract

This work includes the application of a pack cementation of germanium-doped aluminum and silicon coatings on low alloy steel type-T21 yields a significant improvement in the oxidation resistance . Steel-T21 was coated with germanium-doped aluminizing-siliconizing. Diffusion coating was carried out at 1050 °C for 6 h under an Ar atmosphere by simultaneous germanium-doped aluminizing-siliconizing process. Cyclic oxidation tests were conducted on the coated steel-T21 alloy in the temperature range 300-900 °C in air for 60 h at 3 h cycle. The results showed that the oxidation kinetics for coated system in air was found to be parabolic .Oxide phases that formed on coated system are SiO₂ and Al₂O₃.Statistical analysis show that there is a good agreement between experiments results and Finite element results . In addition there is a good agreement between experiments results and theory results.

Keywords: Steel-T21, oxidation, aluminizing-siliconizing, pack cementation.