

Improvement of high temperature oxidation of low carbon steel exposed to ethanol combustion product at 700°C by hot-dip aluminizing coating

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20328484&lokasi=lokal>

Abstrak

Low carbon steel (AISI 1005) was coated by hot-dipping into a molten Al-10% Si bath at 700 °C for 18s. After hot-dipping treatment, the coating layers consisted of Al, Si, FeAl₃, Fe₂Al₈Si, and Fe₂Al₅. The bare steel and the aluminized steel were isothermally oxidized at 700 °C in ethanol combustion product at atmospheric pressure for 49 h.

The aluminized steel shows good performance in high temperature oxidation because the formation of Al₂O₃ layer on the coating surface. The growth of iron oxide nodules on the surface coating was accelerated by rapid outward diffusion of Fe-ions due to the presence of H₂O-vapour generated by ethanol combustion. Thus, the oxidation rate of aluminized steel increased, resulting in a substantial mass-gain as the oxidation time increased. After longer exposure, the Fe₃-(Al,Si) phase was completely transformed to the FeAl in the outer layer. The FeAl formed near the steel substrate was due to Fe-atoms diffusing into the Fe₂Al₅ layer when the time and temperature increased.