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Inter-Filling of CaO and MgO Mixed Layer in Surface Behavior of Al-Mg Alloys Containing Al2Ca

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Abstract : Oxide layer of normal Al-Mg alloy can be characterized by upper MgO and lower MgAl2O4 spinel. The formation of the MgO outmost layer occurs by the surface segregation of Mg in the initial oxidation. After then, the oxidation is proceeded with the formation of MgAl2O4 spinel beneath the MgO. Growth of the oxide layer is accelerated by constant formation of MgAl2O4 spinel. On the other hand, the oxidation resistance of Al-Mg alloys can be significantly improved simply by Mg+Al2Ca master alloy use as the Mg alloying element and such an improvement is attributed to the CaO/MgO mixed layer. Al-Mg alloy containing Al2Ca shows CaO as the upper layer and MgO as the lower one without MgAl2O4 spinel. Such a dense oxide film acts as a protective layer. However, the CaO/MgO scale has the outmost MgO, partly, after a long time exposure to a harsh oxidation condition. The aim of this study is to investigate the inter-filling behaviour of CaO and MgO mixed layer in oxidation resistance mechanism of Al-Mg alloys containing Al2Ca. The process of outmost MgO layer formation will be clarified.

Keywords: Al-Mg alloy, Al2Ca, oxidation, MgO

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