

Aluminum rejection in Galvannealed TRIP steel

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The behavior of aluminum in galvannealed steel was investigated upon annealing. Commercial grade zinc was coated from molten bath followed by annealing at 467 °C. Cross-sectional ion image showed Interfacial crack initiating from the interface of Zn-Fe alloy and Fe. Grain size ranging from 105nm to 650nm were formed in the reacted Zn-Fe layer. Aluminum, a trace element existing commercial grade zinc, forms precipitates with adding elements in both Zn-Fe compound layer. Elemental mapping shows that types of precipitates containing Al were dependent upon the existence of element Mn in the precipitates. $MnAl_2O_4$ was formed in the Zn-Fe compound layer while Fe-Al compound forms at the Fe substrate side. From the elemental distribution, it was concluded that the aluminum that can not form precipitates matched with manganese was rejected out of the reacted layer and forms compound with the major constituent of the base materials, Fe.

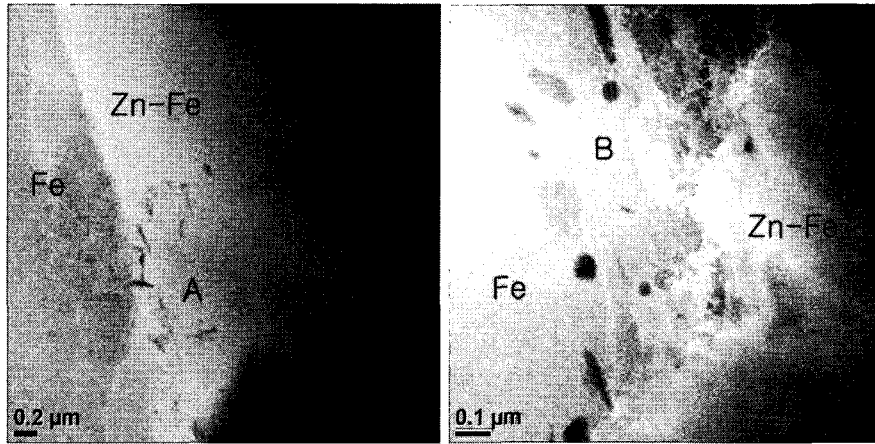


Fig. 1. Cross-sectional TEM (XTEM) image of TRIP GA steel

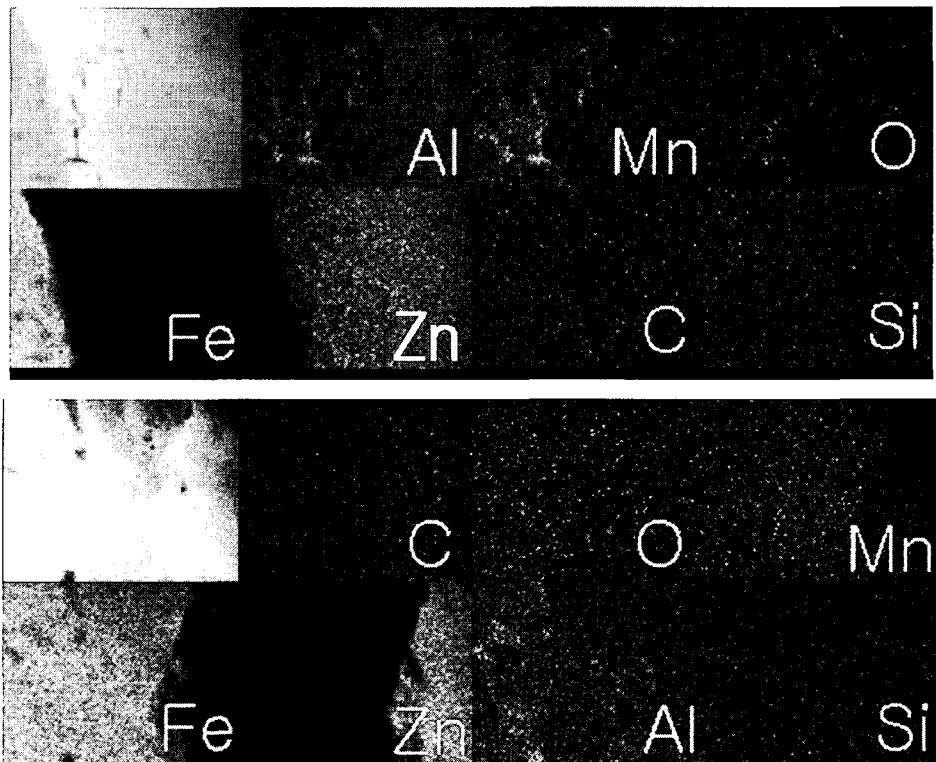


Fig. 2. EDS maps of TRIP GA steel

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