



*Proceedings of Iran International Aluminium Conference (IIAC2018)  
April 24-25, 2018, Tehran, I.R. Iran*

## **Effects of the addition of Mg and raw material molar ratio on the titanium aluminide-alumina composite formation mechanism**

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**Abstract:** The effects of the molar ratio of raw materials ( $\text{TiO}_2$  and Al) and the addition of Mg on the titanium aluminide

- alumina composite formation mechanism were investigated. To achieve this goal, three molar ratios of 1.5:6.5, 1.5:3.5 and 3:5 of  $\text{TiO}_2$ :Al, without the presence of Mg for the first step, and with 2 wt% Mg for the second step were used. A Differential thermal analysis was applied to determine the critical temperatures of each ratio. Based on the DTA results, the heat treatment was performed. It was found that with the increase of the aluminum content, reactions accelerate due to the merge of the sub-reactions, and subsequently, it causes the transient phase number to decrease.

For the second step of experiments, Mg was added to the previously mentioned molar ratios of  $\text{TiO}_2$  and Al. Mg reduced the reaction temperatures and accelerated the reaction processes as a result of a low melting point eutectic formation.

**Keywords:** Titanium aluminides; DTA; Molar ratio; Mechanism; Mg.