Project Title

Production of Gamma Titanium Aluminide and Grossite in a Pilot Scale Via Aluminothermic Reduction of TiO2 (KRH Process)

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Abstract

ϒ-TiAl as a new class of strategic and advanced material, has an important role in development of aerospace vehicles. The conventional process for remelting of Ti and Al in a VAR furnace which is a production comprises of multi difficult and an expensive process which leads to the high price of product and hence, limitation in its application. In this project, aluminothermic reaction of TiO_2 was used for production of ϒ-TiAl. This process, which is registered as an international production of monolithic patent as KRH process, comprises the following stages: mixing TiO_2, Al, $KClO_4$ and Ca, pouring the mixed materials in a ceramic crucible and then combustion vessel and finally heating the vessel. Ca and $KClO_4$ additives increase the heat of reaction, facilitates the slag formation, and as a result, easily separation of two valuable phases (ϒ-TiAl and grossite). Production of grossite ($CaAl_4O_7$) that has a suitable thermal shock resistance is currently under investigation. The KRH process advantages in comparison with the conventional methods are its simplicity of technology and due to the replacement of Ti by TiO_2 is more economical. This project has been exploited in the Advanced Materials and Technology Research Center with cooperation of IUST university at a pilot scale.