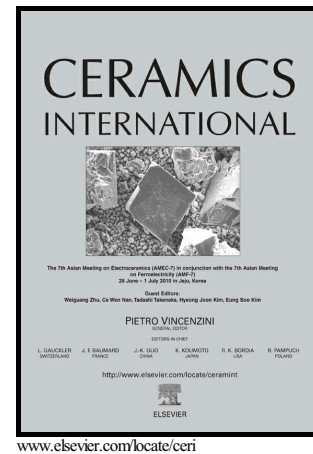


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PII: S0272-8842(18)30450-4
DOI: <https://doi.org/10.1016/j.ceramint.2018.02.140>
Reference: CERI17542

To appear in: *Ceramics International*

Received date: 17 December 2017
Revised date: 15 February 2018
Accepted date: 15 February 2018

Cite this article as: Kaveh Torkashvand, Esmaeil Poursaeidi and Maryam Mohammadi, Effect of TGO thickness on the Thermal Barrier Coatings Life under Thermal Shock and Thermal Cycle Loading, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.02.140>

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Effect of TGO thickness on the Thermal Barrier Coatings Life under Thermal Shock and Thermal Cycle Loading

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Abstract

Effect of thermally grown oxide (TGO) thickness on thermal shock resistance of thermal barrier coatings (TBCs) and also their behavior under a cyclic loading (including aging at maximum temperature) was evaluated experimentally. In order to form different thicknesses of TGO, coated samples experience isothermal loading at 1070 °C for various periods of times. Heat-treated samples were heated to 1000 °C and cooled down rapidly in water from the substrate side using a mechanical fixture. The life of samples was investigated as a function of TGO thickness. Furthermore, by performing an experiment the simultaneous effect of the TGO growth and thermal expansion mismatch– on the failure of thermal barrier coatings was evaluated. The results demonstrated that the presence of TGO with a thickness of 2 to 3 micrometers has a positive effect on the resistance against thermal shock.

Keywords: Thermal shock; Thermal cycling; TGO thickness; Thermal barrier coating

1. Introduction

The typical structure of thermal barrier coatings consists of four layers with each layer

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