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Number 5 2001

ISSN: 0079-6425

Progress in Materials Science

An International Review Journal

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**A. G. Evans, D. R. Mumm, J. W. Hutchinson,
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Progress in Materials Science 46 (2001) 505–553

Progress in
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Mechanisms controlling the durability of thermal barrier coatings

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Received 25 August 2000; accepted 10 October 2000

Abstract

The durability of thermal barrier coatings is governed by a sequence of crack nucleation, propagation and coalescence events that accumulate prior to final failure by large scale buckling and spalling. Because of differing manufacturing approaches and operating scenarios, several specific mechanisms are involved. These mechanisms have begun to be understood. This article reviews this understanding and presents relationships between the durability, the governing material properties and the salient morphological features. The failure is ultimately connected to the large residual compression in the thermally grown oxide through its roles in amplifying imperfections near the interface. This amplification induces an energy release rate at cracks emanating from the imperfections that eventually buckle and spall the TBC. © 2001 Elsevier Science Ltd. All rights reserved.

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