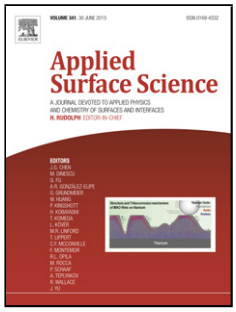

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What is the suitable segmentation crack density for atmospheric plasma sprayed thick thermal barrier coatings with the improved thermal shock resistance?

L. Wang[1,*], X.H.Zhong[1], F. Shao[1], J.X.Ni[1], J.S. Yang[1,2], S.Y. Tao[1], Y. Wang[3]

[1]Key Laboratory of Inorganic Coating Materials CAS, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 201899, PR China;

[2]University of the Chinese Academy of Sciences, Beijing 100039, PR China

[3]Laboratory of Nano Surface Engineering, School of Materials Science and Engineering, Harbin Institute of Technology, Harbin, 150001 PR China

* Corresponding author. Tel.:+86-021-69906320 Fax: +86-021-69906322

E-mail address: L.Wang@mail.sic.ac.cn; glacier_hit@126.com

Highlights

- Segmentation crack density play an important role in controlling the lifetime of the as-sprayed TTBCs
- The propagation rate of the main segmentation crack has been calculated
- The life prediction model based on the fracture mechanical method has been established

Abstract:

The optimization and control of the segmentation crack density (D_s) for the thick thermal barrier coatings (TTBCs) with the improved thermal shock resistance has been performed via finite element modeling. The simulation results based on the current property parameters of each layer of the TTBCs fabricated by atmospheric plasma spraying (APS) are well consistent with the experimental results of thermal shock test. The investigation results indicate that too large or too low D_s will be not beneficial to the improvement of the thermal shock resistance of the TTBCs. The D_s must be located at a suitable range, and this paper has revealed the objective law