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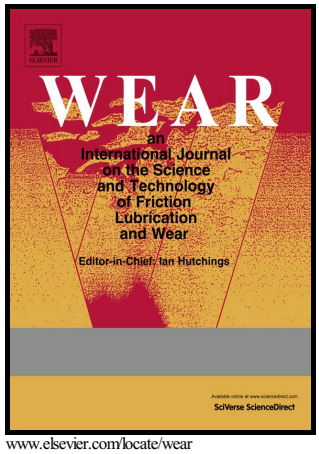

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Fracture mechanism maps for thermal barrier coatings subjected to single foreign object impacting

W. Zhu [a, b], Y. J. Jin [a, b], L. Yang [a, b*], Z. P. Pi [a, b], Y. C. Zhou [a, b]

[a] *Key Laboratory of Key Film Materials & Application for Equipment (Hunan province), School of Materials Science and Engineering, Xiangtan University, Xiangtan, Hunan 411105, China*

[b] *Key Laboratory of Low Dimensional Materials and Application Technology of Ministry of Education, School of Materials Science and Engineering, Xiangtan University, Xiangtan, Hunan 411105, China*

Abstract: To further understand the erosion mechanism of the electron beam physical vapor deposited thermal barrier coatings, the failure mechanism diagrams with different parameters were established by finite element simulations. The effects of various parameters on foreign object erosion were discussed. The location and type of coating cracks under different conditions were predicted. It was found that the possibility of crack nucleation increases with the increase of the particle velocity, particle radius and impact angle. Compared to the structural and material parameters of thermal barrier coatings, the erosion particle parameters (particle velocity, particle radius and impact angle) have a greater effect on the coating failure. All of these results give corresponding suggestions and advices for process optimization of thermal barrier coatings.

Keywords: Thermal barrier coatings; Erosion; Finite element method; Fracture mechanism map

*Corresponding authors: e-mail: lyang@xtu.edu.cn (L. Yang).

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