

Mechanical performance of SiC-based nanolaminate coatings

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Abstract

The improvement of the thermomechanical performance of coatings remains an important subject for engineering fields dealing with severe environments. The durability of coatings often controls the durability of the devices and structures, hence their safety, efficiency and environmental impact. In this context, 2D nanostructured coatings “nanolaminates” offers extra degrees of freedom to produce high strength / high toughness films combined to other performances such as corrosion or irradiation resistance. In this work, SiC-based nanolaminated thin films have been deposited using RF and DC magnetron sputtering. The mechanical performances of the nanolaminates have been determined by nanoindentation and using a residual stress actuated on-chip testing method. The relationship between the film composition/structure, its mechanical properties and the effect of annealing and ion irradiation has been evaluated. It appears that the rate sensitivity and the high number of internal interfaces are key features to delay damage and increase the durability of the systems.

Keywords:

thin films on chip tests nanolaminate

