Qualitative fracture analysis of Si-C-N hard coatings: interfacial and triaxiality effect

Arnab S. Bhattacharyya[1] and Kushal Bhattacharyya[2]

[1]Central University of Jharkhand
[2]Netaji Subhash Engineering College

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Abstract

The mechanical properties of hard thin films need meticulous and precise inspection for their efficient applicability. SiCN hard coatings deposited on silicon substrates underwent Vickers indentation and fracture analysis was performed with the help of images of fractured regions under the microscope. The fractured regions were matched with geometrical patterns and the mechanism of the occurrence of delaminated and regions subject to brille failure was studied. Finite Element Analysis (FEA) were carried out to study the elastic-plastic as well as ductile to brittle transition in the indentation process. The novel features in the fracture process identified will add to the knowledge in the field of fractographic studies of hard coatings. The findings shall be helpful in fracture analysis of components subject to loading used in heavy-duty equipment as well as MEMS.

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