Fracture analysis of thin film

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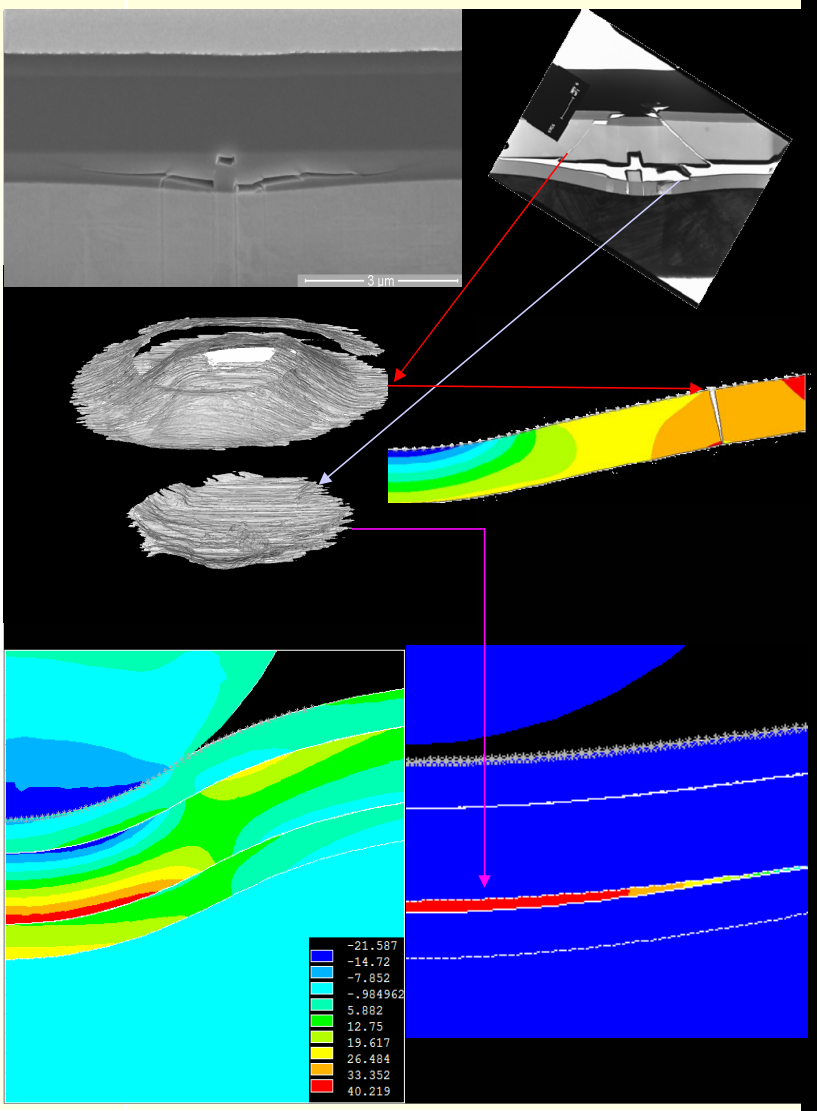
Overview

The University of New South Wales is renowned for the quality of graduates and its commitment to new and creative approaches to education and research.

Its motto – Scientia Manu et Mente ("Knowledge by Hand and Mind") – encapsulates the University's central philosophy of balancing the practical and the scholarly.

University enjoys the reputation of Australia's leading international university with over 200 sister university partnerships around the world, amongst many other international activities. UNSW has developed strong research relationships and student exchange programs with these international partners.



Testimonial

I am satisfied with cohesive zone element's results in ANSYS v10. I am able to simulate the delamination process and crack propagation in the thin coating system avoiding singularities.

Rajnish Singh
UNSW

Challenge

"To simulate the interfacial delamination of the thin film during indentation"

In classical fracture mechanics, a crack tip is characterised by either a single material parameter in elastic cases, or J-Integral in non-elastic cases. It also assumes an infinitely sharp crack tip containing infinite stress.

In a real case scenario neither of the above postulations exits.

Solution

Cohesive elements owning elastic constitutive law of zero thickness were employed between the interfaces.

Standard contact elements were coupled with cohesive elements, to prevent any cross-over of cohesive elements during compressive loading.

The position of a crack tip was identified using the peak of the traction curve.

Benefits

The cohesive zone model (CZM) allows the simulation the cracking behaviour at the interfaces and is a preferred method to simulate crack initiation and propagation, avoiding any singularities.

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