

Cardiff School of Engineering
Engineering Infrastructure: Challenges for 2020

Reference	PS3-SB-2011
Supervisors	Prof S P A Bordas, Dr P Kerfriden
Programme of Study	PhD in Engineering
Project title	Understanding material failure : Multiscale fracture models for silicon wafer manufacturing
Start date	1 st October 2011
Duration	3 years
Source of funding	Cardiff University and SOITEC SA
Project summary	<p>The phenomena behind material failure have kept researchers in check for decades. Wear and degradation of structures causes pecuniary and human losses and any advance in their understanding is important.</p> <p>But failure can also have positive effects. Inspired by the nuclear industry where hydrogen bombardment (ionisation) leads to material degradation, Soitec SA have engineered a revolutionary process to increase the quality of silicon wafers. This technology, known as the SmartCut™ process relies on actually utilizing fracture to improve manufacture.</p> <p>Although the SmartCut™ Process has been in use for nearly 20 years, the fundamentals behind it remain unclear and it is still difficult for engineers to predict the topology of the fracture surface which is key to the quality of the end product. This will be the main aim of the project.</p> <p>This aim can only be achieved by developing new methods for the simulation of the onset of the initiation propagation and coalescence of cracks in the structure. The project's objectives are as follows:</p> <ul style="list-style-type: none"> • Predict the roughness of the surface obtained by the SmartCut™ process • Accurately predict the initiation of the micro cracks (nucleation point, direction) • Accurately predict the multiple micro crack paths until coalescence • Explain the deviation of the crack inside the bulk of the material as a function of material and interfacial properties
Number of awards	1
Amount of funding	The award will cover tuition fees at the Home/EU fee rate and will provide a stipend at the UK Research Council rate (£13,590 in 2010/11) plus an enhancement of at least £1,000 per annum.
Eligibility	The studentship is open to Home or EU candidates only.
Academic criteria	Candidates should have a first-class honours degree, or a 2.1 plus a postgraduate Masters degree (or their equivalents), in a relevant subject. Applicants whose first language is not English will be required to demonstrate proficiency in the English language (IELTS 6.5 or equivalent

Contact for further information	Prof Stéphane Bordas, BordasS@cardiff.ac.uk
How to apply	Applications can be made online at www.cardiff.ac.uk . PLEASE ENSURE YOU QUOTE THE STUDENTSHIP REFERENCE ABOVE ON YOUR APPLICATION. (For online applications, please put reference in the "Prospective Supervisor" section).
Deadline for applications	18 th March 2011