**IN SITU STABLE FRACTURE OF CERAMIC INTERFACES**

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The fracture toughness of ceramics is often dominated by the structure of their grain boundaries. Our capacity to improve the performance of ceramic components depends on our ability to investigate the properties of individual grain boundaries. This requires development of new fracture testing methods providing high accuracy and high spatial resolution. Recently, several techniques have been developed using small scaled mechanical testing, based within a nanoindenter, using a variety of tip and sample geometries, including: micropillar compression, microcantilever bending and double-cantilever compression. However, the majority of the published work relies on load-displacement curves for the identification of crack initiation and the geometries can result in a complex analysis of force distribution and stress intensity factor.

Our approach uses a double cantilever geometry to obtain stable crack growth and we calculate the fracture energy under a constant wedging displacement. The tests are carried out within an SEM, this has two benefits: the sample is well aligned for a controlled test and images are recorded during the test for later analysis. Crucially this allows us to use beam deflection and crack length rather than critical load to measure fracture toughness. Our tests have proved it is possible to initiate and stably grow a crack in a controlled manner in ceramic materials for several microns. This approach has been validated on SiC where it gives a good approximation of the surface energy and then extended to SiC bi-crystals along with Ni-$Al_2O_3$ interfaces where crack blunting and bridging mechanism can be observed and measured