**Characterising interfacial adhesion using FIB-based micro/nano-mechanical testing methodologies**

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In the past few decades, there has been a burst of activity in devising new techniques for film adhesion assessment, such as indentation, scratching, stressed over-layer testing, tape peel testing, four/three-point bending, laser spallation and Focus Ion Beam (FIB)-machined micro-cantilever (MC) bending. However, as the dimensions of electronic components continue to scale down, increasingly complex multilayer structures integrated at ever smaller scales have rendered many adhesion measurement techniques inapplicable. Among those aforementioned techniques, “top surface” nanoindentation has been utilized extensively, due to its ability to generate interfacial cracks on a sufficiently small scale and at a specific location. However, in spite of the simplicity of this technique, its application has not been extended to quantify adhesion of an interface “buried” within a multilayer system. FIB-machined MC bending has recently received great attention and has been increasingly utilised for investigating the properties of films, including elastic modulus, strength, fracture toughness, fatigue properties, and residual stresses. This technique has also been successfully applied to investigate the properties of a variety of interfaces by introducing delamination at the interface. In most of the studies, interfacial delamination commonly occurred in an unstable manner, prompting the development of alternative configurations. Most recently, we applied FIB to fabricate fixed-end micro-bridges within an Al/SiN/GaAs multilayer structure, and micro-scale four-point bending was performed to investigate the properties of the SiN/GaAs interface. This technique is capable of generating “stable” interfacial delamination events, which enables quantitative analysis of the interfacial toughness. Micro-mechanical testing using FIB-machined specimens has the unique ability to first isolate and then apply a specific stress to any micro-scale feature embedded within a given material system. The FIB milling process allows complex geometries over a range of scales to be fabricated at any location of a sample. This provides significant potential for studying the interfacial properties within a specific multilayered structure in a miniaturized and complex integrated system.