

SMALL-SCALE TESTING OF CERAMIC MATRIX COMPOSITES

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SiC/SiC CMCs are currently under investigation for application in the aerospace and nuclear industries: for example, SiC/SiC started replacing some of the Nickel-based superalloy components used in the hot section of aeroengines. Internal interphases in SiC/SiC are designed to achieve the graceful failure required in structural applications. Consequently, understanding interfacial crack propagation and measuring interfacial properties such as the fracture toughness, friction or residual stresses is crucial to understand, predict and model the failure of these materials and their degradation in different environments. In SiC/SiC materials the fibers are normally coated with graphite-like C or hexagonal BN interphases to achieve the desired interfacial properties. In this presentation we show different micromechanical tests that can be used to propagate a stable crack at the interfacial region and measure the interfacial fracture toughness. This includes micro Double Cantilever Beam (DCB) and different types of modified push out tests. We perform this tests in a SEM in-situ setup to ensure a reliable measurement of the Mode I and Mode II interfacial fracture toughness while distinguishing between the different debonding and fracture events as they occur. With this work we highlight possible routes of optimization of the new generation of CMC interphases based on their interfacial fr

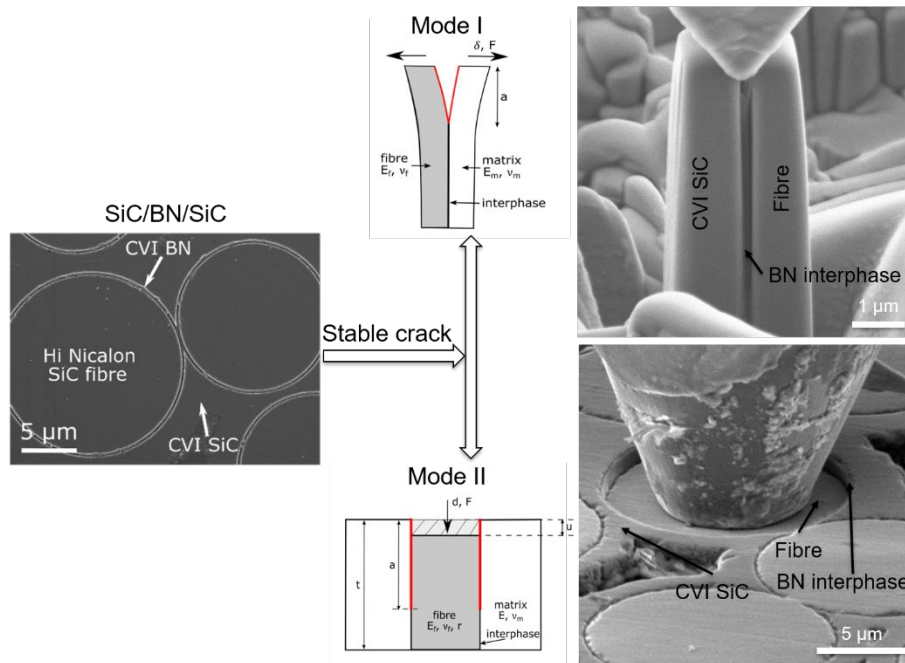


Figure 1 – Overview of different micromechanical tests used to measure the Mode I and Mode II interfacial fracture toughness on a SiC/BN/SiC