

Degradation of High Temperature Polymer Matrix Composite due to Moisture

Composite materials and structures consisting of high strength carbon fibers in a polymer matrix are known for their high strength- and stiffness-to-weight ratios. These properties lead to their application in aircraft, spacecraft, sporting goods, automobiles and other applications. Polyimides are a special class of polymers that can be used at temperatures up to and beyond 300° C. Used as a matrix for a composite, polyimides extend the benefits of composites to high temperature applications such as engine inlets, compressor blades and other hot structures.

When exposed to moisture and high temperatures polyimides may undergo moisture catalyzed bond breaking leading to loss of stiffness and strength. This project will measure the stiffness and strength reduction of a polyimide matrix woven carbon fiber laminate subjected to high temperature and moisture for extended time periods. The project will involve sample preparation, high temperature compression testing, data reduction and archiving, modeling of the results and reporting.

I envision taking on one student for two semesters. The student will work closely with a senior Ph.D. student. Outstanding work may be lead to an article in a referred journal.

Qualifications of Student: Strong background in mechanics of materials and structures, basic understanding of materials science, working knowledge (or ability and willingness to learn) of mechanical testing procedures.

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