

# The improved knittability of polyimide fibers using oxygen plasma and coating treatments

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**Abstract:** The use of knitting for producing advanced composite structures has seen increasing interest in recent years<sup>[1]</sup>. However, there is limited information about the interaction of high performance fibers such as polyimide (PI) fibers with the knitting process<sup>[2]</sup>. In this study, the relationship between knittability and the physical properties of PI fibers on knitting preforms was investigated firstly. The tensile, frictional and bending properties of different PI fibers with high, medium or low strength and modulus were investigated and compared. Then, PI fibers were modified by oxygen plasma treatment to improve the interfacial compatibility between the fibers and resins or sizing agents<sup>[3-6]</sup>. And the plasma treatment time was investigated as the major parameter. The effects of this modification on the physical and chemical properties of the fiber surface were studied by their chemical composition, surface morphology, surface free energy, single filament tensile strength, and interfacial shear strength (IFSS)<sup>[7-10]</sup>. After the plasma treatment of 20Pa, 200W and 150s, the PI fiber surface roughness was significantly improved, some new oxygen-containing groups such as C-O, C=O and O=C-O were generated on the fiber surface and the fiber surface wettability was also greatly enhanced. These results indicate that the oxygen plasma treatment together with coating process is an effectively method to improve the knittability of PI fibers.

**Keywords:** Polyimide fibers, knittability, oxygen plasma, coating

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