

A correlation between surface and flexural behavior of atmospheric Helium plasma modified jute/polyester bio-composites.

Background

Inherent incompatibility of jute fiber with non-polar resin matrix has been considered to be the main obstacle to use it for composite applications. Surface modification with atmospheric plasma is a possible solution to make it potential candidate for composite reinforcement.

Objective

The aim of this project is to modify the jute fiber surface with industrial atmospheric plasma for medium strength composite application. The basic study is to understand the correlation between surface properties and fracture mechanical behavior. In addition, study the effect of different plasma gases on composites behavior is another major area of this project.

Method

Composites were cured followed by vacuum bagging using Quickstep™ process.

Progress

Present study showed that the wettability of jute fiber surface increases with increased coefficient of friction. This correlation becomes more evident after nano level analysis of fiber surface by atomic force microscopy (figure.1). It has been observed that the herring bone structure is partially removed after 5 passes (125 sec) exposure of helium plasma leaving some residues or etching products on the surface. Both XPS and FTIR have shown the strong evidence of surface oxidation. Finally, an improvement in flexural behavior is found as a result of both physical and chemical changes after plasma bombardment on the fiber surface.

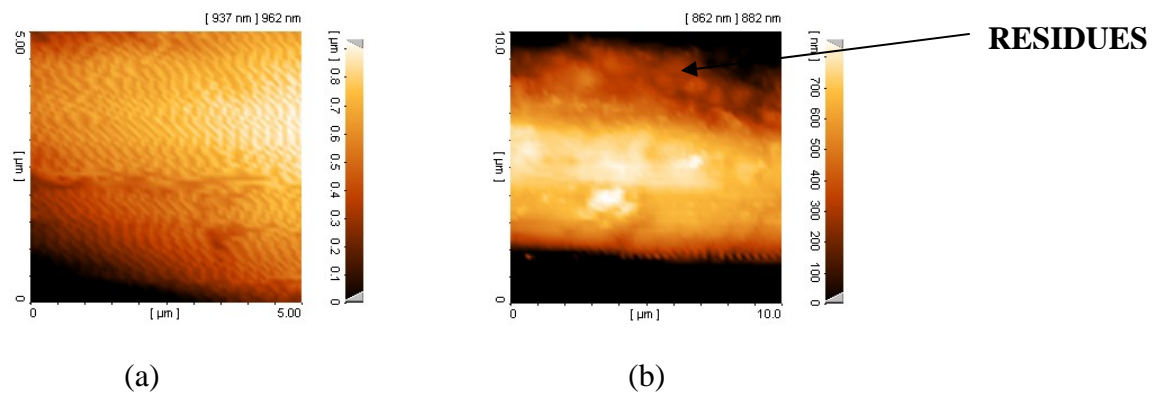


Figure 1 AFM analysis of (a) untreated and (b) He plasma modified jute surface.