

# **Influence of Plasma Source Driving Frequency on Surface Properties of Plasma Treated Kevlar Fabric**

## **Abstract**

Plasma surface modification is a versatile and eco-friendly technique used to tailor surface properties of materials without altering their bulk characteristics. Kevlar, a high-performance polymeric fabric known for its exceptional mechanical strength and thermal stability, finds extensive applications in aerospace, defense, and industrial sectors. The use of kevlar fiber as reinforcement, however, has been constrained by poor fiber/matrix interfacial adhesion. The adhesion between kevlar fiber and most polymer matrix is poor due to the smooth surface of the kevlar fiber. Therefore, it is essential to modify them at a structural level to enhance the physico-chemical surface properties.

The driving frequency of the plasma source plays a critical role in determining the efficacy of the surface modification process. Low-frequency (kHz range) and high-frequency (RF or microwave) plasma sources interact differently with the material surface, influencing key parameters such as ion energy, plasma density, and sheath dynamics. These variations significantly affect surface morphology, functional group incorporation, and wettability of the treated fabric.

This study aims to investigate the influence of plasma source driving frequency on the surface properties of Kevlar fabric. We intend to study plasma polymer interaction with both the frequencies on Kevlar surface. The outcomes will provide valuable insights into the role of plasma driving frequency in tailoring material surfaces for advanced applications.

## **Academic Project Requirements:**

**1) Required No. of student(s) for academic project: 1**

**2) Name of course with branch/discipline: M.Sc. Other**

**3) Academic Project duration:**

**(a) Total academic project duration: 20 Weeks**

**(b) Student's presence at IPR for academic project work: 4 Full working Days per week**

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