

# **Silicon based water repellent and anti-bacterial coating on polymeric substrates using PECVD (Plasma Enhanced Chemical Vapor Deposition) Method**

## **Abstract**

Water repellent coatings on polymers play a crucial role in enhancing the performance and functionality of various materials. These coatings are designed to prevent the penetration of water, thereby protecting the underlying material from moisture-related damage and improving its durability. The application of water repellent coatings is widespread in industries such as packaging, biomedical, outdoor apparel, sportswear, military equipment, automotive interiors, and more. The water repellency on surfaces of polymers is achieved by altering the surface energy and structure of the material. The development of water repellent coating technology is driven by the need to provide products with improved resistance to water, stains, dust removal and other environmental factors. It is becoming highly demanding in biomedical, textile and packaging sector.

The proposed work involves design and execution of experiments for deposition of silicone based water repellent coating on polymers (used in medical industry), bamboo/organic composite and cotton fabric surface by PECVD method. A detailed comparative study will be performed using high frequency (13.56 MHz) and mid frequency (40 kHz) plasma sources. Growth pattern, deposition rates and other coating properties will be studied as a function of plasma source driving frequency and monomer/ carrier gas mixing ratio.

Apart from experimentation, the candidate will be performing characterization of coated surfaces for water repellent properties /surface energy, surface chemistry and surface morphology using water contact angle goniometer, FT-IR (Fourier Transform Infra-Red) spectroscopy, Scanning Electron Microscopy (SEM) techniques.

## **Academic Project Requirements:**

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

**2) Name of course with branch/discipline: B.E./B.Tech. Other**

**3) Academic Project duration:**

**(a) Total academic project duration: 25 Weeks**

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

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