

Develop a Garment Compatible Hydrophobic and Oleophobic Coating Through the Activation Process of PECVD Using C-Zero Chemistry

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Garment compatible functional surfaces have a higher demand in the textile industry due to many applications. However, the development of a fluorocarbon-free functional surface with oleophobic properties is difficult to obtain compared to the hydrophobic properties. Generally, an economically viable, simple and efficient process is essential for large-scale production of garment compatible oleophobic coatings. In this study, first nylon fabric surfaces were activated using the PECVD (plasma enhanced chemical vapor deposition) method before the silicon coating process. A low viscous silicon polymer was used as the durable adhesive material and low surface energy substrate. The two kinds of particles such as SiO₂ and ZnO were used in two different size ranges to create nano roughness thin coating on the fabric surface. The surface and cross-sectional images of SEM showed the effect of activation on changing the fiber structure and deposition of particles on the silicon-coated fabric respectively. The concentration of 3% w/w SiO₂ and ZnO coated fabric sample was obtained the maximum oil droplet remaining time for the kaydol liquid. However, the prepared surface only exhibited hydrophobic properties with oleophilic properties resulting in average water contact angle larger than 120° with 68.325° of average kaydol contact angle. The aesthetic appearance of prepared surfaces was similar to the original nylon fabric. Moreover, the prepared surface had a negligible effect on changing the tensile strength value compared to the original fabric.

Keywords: Fluorocarbon-free, Oleophobic, Hydrophobic, PECVD, Silicon, Kaydol