

SURFACE TREATMENT OF HEMP MATERIALS

İdil Yiğit^{1,2}, Semiha Eren², Zaide Saka³ and Aliye Akarsu Özenç³

¹ Bursa Uludag University, Textile, Clothing, Footwear and Leather Department, Vocational School of Orhaneli, Bursa 16059, Turkey, e-mail: idyigit@uludag.edu.tr

² Bursa Uludag University, Textile Engineering Department, 16059, Turkey, e-mail: semihaeren@uludag.edu.tr

³ Bursa Uludag University, Textile Engineering Department, 16059, Turkey, e-mail: aakarsu@uludag.edu.tr, zaidesaka@uludag.edu.tr

Abstract: Hemp undergoes various pre-treatments before industrial applications due to the complex interactions of cellulose, hemicellulose, lignin, and pectin in its structure. Processes applied to hemp surfaces enhance polarity, remove lignin and hemicellulose, purify the structure from surface waxes, and increase fiber adhesion. In a reference study on lignin removal, ozone was found to attack the aromatic ring structure of lignin, subsequently degrading it [1].

In this study, surfaces of woven fabric were treated with ozone gas, a natural and environmentally friendly approach, for 60 minutes at different gas flow rates (maximum and minimum). The aim was to enhance the adhesion performance of hemp for diverse applications. In addition to physical performance tests like hydrophilicity and strength, SEM and FTIR analyses were conducted on ozonated samples, with results compared to untreated samples.

Upon examining Table 1, it becomes evident that hydrophilicity values increase with higher gas flow rates in ozonated samples. This increase suggests greater hydrogen bond formation on the fiber surface post-ozonation, thereby improving hydrophilicity properties, in accordance with existing literature [2-5].

5 L/min flow rate- 60 min

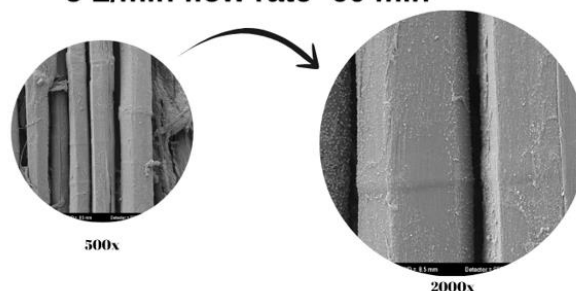


Figure 1 SEM images of ozonated hemp fabric

When the samples were examined at 2000x magnification on the SEM device, it was determined that the roughness on the sample surface increased with increasing time, regardless of the gas flow.

Keywords: hemp, surface, modification

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Table 1 The physical performance tests of ozonated fabrics

Fabric Type	Hydrophilicity (second)	Tensile Strength (kN)
Untreated Hemp Fabric	280	1157
Ozone Treated (Min. flow rate_60 min) Hemp Fabric	60,25	1250
Ozone Treated (Max flow rate_60 min) Hemp Fabric	15,75	1281

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