Incorporation of lotus effect on textile surfaces through superhydrophobic finishes

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Declaration

I, Miss Hina Iftikhar ID: 15025089004 student of Ms.tx in subject area of textile design hereby declare that the contents of the thesis, "**Incorporation of Lotus Effect on Textile Surfaces through Super hydrophobic Finishes**" is product of my individual research and that, to the best of my information and faith, no portion has been copied from any already available material (except the references, standards, history and mathematical models/equations etc.) I further state that this work has not been submitted for award of any other diploma/degree. The university can take action if the information provided is found inaccurate at any time.

Hina Iftikhar

Date: 24th May, 2017.

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Abstract

Super hydrophobic finished surfaces have gained a lot of importance in technical textile industry due to their unique chemical and multifunctional properties. Super hydrophobicity is such unique effect that is gained through the combination of surface roughness and chemical composition. Study on the super hydrophobicity of the surfaces has shown that the lotus plant is the best natural specie to mimic in order to get the water repellency property in a surface. The level of water repellency of the surfaces depends upon the contact angle between surface and water droplet (i.e. more than 150° in case of superhydrophobicity)

Such a demandable phenomenon is being practiced through multiple methods and techniques. Incorporation of superhydrophobicity into three different fabric surfaces has been the base of experiment. All the three fabric substrates were woven under similar construction composition. Similar yarn count i.e., 16 Ne were used and same weaving composition i.e., twill weave 3/1 (Z) were given for development of the surfaces for finish. TiO_2 based super hydrophobic finish was be synthesised and the results were compared with commercially available water repellent finish Rucogaurd from Rudolf Chemical Pvt, Ltd. The super hydrophobic finishes were applied through the simple padding process. Different mechanical testing methods were applied to observe its mechanical strength.

Achievement in lotus plant structure imitation gave amazing result of self-cleaning property to the textile surface which will not only repel water droplets but also protect itself from the impurities. Studies shows that TiO_2 based super hydrophobic finish will be most effective for attaining the best upholstery surface for exteriors and interiors.

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Introduction

1.1 Background

The economy of a country increases automatically when experimentations are done to bring new ideas based on the researches. Technology is the fuel to make the ideas implement quickly for the betterment of the industry. By the study of innovations, it is evident that whenever scientists and engineers struck into a problem, nature gives the ultimate explanation. The study of nature tells that there are number of natural structures that are not only unique in their structures but also in their functions [1].

In the modern technical era, the nature has become inspiration for many innovations. Such advanced technical materials are now the buzzword for the scientific world. Experimentations are done to create unique and multifunctional surfaces. Among such interesting innovations of the scientist and engineers are super hydrophobic surfaces. Such waterproof surfaces are need of today's world in different industrial and commercial applications [2].