

76. Title: Multifunctional fabric

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Keywords: Smart textiles, Anti-microbial, UV protection

Domain: Textiles

Summary: The multifunctional fabric manufactured by the process of sandwiching of titania nanostructures using crosslinking agents to achieve different properties such as photocatalytic, UV- Protecting, self-cleaning, antimicrobial, anti-fouling, and anti-wrinkle which increases the performance compared to the single layered titania nanostructures. This involves sandwiching of commercial grade titania using crosslinking binders such as DMDHEU, substituted Dimethylol ethylene urea (DMEU), compounds with 1,2-dihydroxy and 1,3-dihydroxy groups, and similar compounds multi-hydroxyl groups for strong binding of nanostructures to the surface of fabrics. The invention aims to achieve strong retention of titania nanoparticles on the fabric with multiple sandwiching on fabric to achieve desired multifunctional properties and strong photocatalytic reduction of dyes and organic stains on the fabric.

- » **Nanostructure:** It utilizes the commercial grade titania with titania nanostructures of size ranging from 10nm to 100nm.
- » **Self-cleaning:** If there are organic stains on the fabric say, food stains, juice stains, etc. the stain will disappear automatically within 2-4 hours once the fabric is put in the sunlight.
- » **Anti-microbial:** Due to the antimicrobial property, the fabric will not allow growth of microbes, kill microbes and shall prevent development of smell during the course of its use in various applications.
- » **UV protective:** This fabric protects from harmful radiation. The fabric developed after this process will have high absorbance for the UV radiation falling on it.
- » **Anti-wrinkle:** The fabric developed also has anti-wrinkle property which makes it robust and requires less maintenance.

Advantages:

- » It can be introduced in cotton, polyester, blended fabrics and other natural and synthetic fabrics.
- » The technique has capability for strong retention of nanostructures and photocatalytic activity; keeps durability of 30 washes at 60°C.
- » This technique keeps the fabric wearable for 7 days without washing.

Applications:

- » Home textiles (curtains, etc. which are very less frequently washed) and Apparels
- » Surfaces which are prone to contact with multiple persons (seats & furniture surfaces), etc.

Scale of Development: A prototype fabric is developed and performance is demonstrated in relevant environment.

Technology Readiness Level: 8

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