

Dyeing easier : New potential for dyeing polyester with chitosan

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Commercial chitosan is derived from the shells of shrimp and other sea crustaceans, including *Pandalus borealis*, pictured here.

Najua Tulos and co-researchers of the Faculty of Applied Sciences, Universiti Teknologi MARA (UiTM), Shah Alam, studied the potential of chitosan to dye polyester fabric. Produced commercially by removing the acetyl groups from chitin (a derivative of glucose), chitosan was found to greatly improve the colourfastness of polyester fabrics.

Polyester is a man-made fiber that is extensively produced in [factories](#) for clothing and home furnishings. Indeed, [polyester](#) has taken the world by storm. Its wide use reflects its range of pleasing properties, high resilience, stretch and recovery; good strength and dimensional stability; it is also highly wrinkle resistant. The insoluble nature of polyester fibers when exposed to water also limits enzymatic hydrolysis to the [surface](#),

thus improving the fibre surface wettability.

However, polyester does not take [dye](#) well. That is, it is not easy to colour polyester. Polyester fibers have definitive hydro-phobic character and high degree of crystallinity, thus being difficult to penetrate with dyes. Disperse dye is the only effective dye for polyester and usually done at a high temperature (about 130°C) in order to increase the dye up-take.

This research studied the potential of chitosan to dye polyester fabric at lower temperatures.

In the experiment, the white polyester fabric surface was treated with chitosan by exhaustion method, pad-dry-cure and ultrasound. The treated fabrics were then dyed with reactive dyes at low temperature. The colourfastness to washing, colourfastness to perspiration, colourfastness to rubbing/crocking and colourfastness to light were evaluated to measure the colour change and staining.

It was found that the dyed polyester had excellent colorfastness to washing with a rating between 4/5 and 5 for color change, and 4/5 and 5 for staining. This was made possible as the surface of polyester was treated with chitosan solution. The chitosan made it dyeable even under lower temperatures.

They concluded that reactive dyes have higher affinity for polyester fibres after the fabric surface being treated.

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