Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 66 2026

Colloquium on Applied Sciences 1 2026
19-22 January 2026, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Comfort Properties and Colour Fastness of Fabrics Coated with Thermochromic Dyes Via Pad-Dry-Cure Process

Muhammad Aqil Mohd Shukri[a] & Nor Dalila Nor Affandi[ab*]

Structured Abstract

Background: Thermochromic materials is the ability of the fabric to change its color in response to temperature variations. This gives thermochromic materials immense potential in the production of intelligent fabric materials. Despite the immense potential of thermochromic materials in the production of intelligent fabric materials, the application of thermochromic materials in fabric production has not received much attention due to the limitations of the materials in terms of their comfort properties, particularly in relation to the application of coatings in the production of fabric materials. Comfort properties such as air permeability and water vapor permeability are significant factors in the production of fabric materials.

Methods: The objectives of the present study were to investigate the comfort properties of the cotton fabric treated with thermochromic dye by evaluating the air permeability and the water vapour permeability of the fabric. In addition, the study examined the effect of the varying concentrations of the thermochromic dye on the color fastness of the fabric to perspiration at pH 5.5. The wet pick-up of the fabric during the coating process was strictly controlled within the range of 80-90%. The comfort properties were evaluated on the basis of the varying concentrations of the thermochromic dye used to treat the fabric, expressed as percentage. Standardized methods were used to determine the comfort properties of the fabric to obtain accurate results.

Results: An increased concentration of thermochromic dye showed a significant reduction in both air permeability and water vapor permeability. This can be attributed to an increased thickness of the fabric and blockage of pores. However, increased concentrations of the thermochromic dye showed an improvement in color fastness related to perspiration. This implies an improvement in color stability and reduced susceptibility to color change and staining.

Conclusion: Based on the findings of the research, the conclusion was drawn that the values of the 3% concentration of the thermochromic dye to have the highest degree of comfort properties and highest degree of colour fastness to perspiration. The thermochromic fabric therefore shows potential application in military.

Keywords: Thermochromic fabrics, Thermochromic dye, Comfortability, Concentration, Military

Correspondence: dalila@uitm.edu.my

[a]School of Industrial Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

[b]Textile Research Group, Universiti Teknologi MARA, Shah Alam, Malaysia