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Automatic Vertical Wicking Tester Based on Optoelectronic Techniques

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Abstract : Wicking property is important for textile finishing and wears comfort. Good wicking properties can ensure uniformity and efficiency of the textiles treatment. In view of wear comfort, quick wicking fabrics facilitate the evaporation of sweat. Therefore, the wetness sensation of the skin is minimised to prevent discomfort. The testing method for vertical wicking was standardised by the American Association of Textile Chemists and Colorists (AATCC) in 2011. The traditional vertical wicking test involves human error to observe fast changing and/or unclear wicking height. This study introduces optoelectronic devices to achieve an automatic Vertical Wicking Tester (VWT) and reduce human error. The VWT can record the wicking time and wicking height of samples. By reducing the difficulties of manual judgment, the reliability of the vertical wicking experiment is highly increased. Furthermore, labour is greatly decreased by using the VWT. The automatic measurement of the VWT has optoelectronic devices to trace the liquid wicking with a simple operation procedure. The optoelectronic devices detect the colour difference between dry and wet samples. This allows high sensitivity to a difference in irradiance down to 10 $\mu W/cm^2$. Therefore, the VWT is capable of testing dark fabric. The VWT gives a wicking distance (wicking height) of 1 mm resolution and a wicking time of one-second resolution. Acknowledgment: This is a research project of HKRITA funded by Innovation and Technology Fund (ITF) with title “Development of an Automatic Measuring System for Vertical Wicking” (ITP/055/20TP). Author would like to thank the financial support by ITF. Any opinions, findings, conclusions or recommendations expressed in this material/event (or by members of the project team) do not reflect the views of the Government of the Hong Kong Special Administrative Region, the Innovation and Technology Commission or the Panel of Assessors for the Innovation and Technology Support Programme of the Innovation and Technology Fund and the Hong Kong Research Institute of Textiles and Apparel. Also, we would like to thank the support and sponsorship from Lai Tak Enterprises Limited, Kingis Development Limited and Wing Yue Textile Company Limited.

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