

## **Microencapsulation and thickness effect on the occurrence of hysteresis of thermochromic liquid crystal calibration**

### **ABSTRACT**

This paper presents the investigation of the occurrence of hysteresis on the Thermochromic Liquid Crystal (TLC) which act as the sensor in many industries especially in heat transfer investigation of turbine blade application. The occurrence of hysteresis is said to be neglected as mentioned by the manufacturer but due to the surface preparation method, experiment setup and the condition of the experiment, the hysteresis may occur which been affected by factors such as thickness and microencapsulation. Therefore, the objective of this research is to determine the effect of TLCs film thickness and microencapsulation on the occurrence of hysteresis of TLCs calibration. The TLCs sample was prepared in three mixtures in which, one is unsealed pure TLC and the other two composed of a different ratio of TLC, binder and water that be applied on the copper plate by airbrush method. The TLCs samples than been heated up to 50°C which is just above the clearance temperature point and been cooled down to 30°C which is the temperature below the red colour starts. The result obtained show that the microencapsulation avoids the occurrence of the hysteresis by reducing the peak temperature shifting distance between the heating and cooling curve. However, using microencapsulation only is found to be not sufficient enough to avoid the occurrence of the hysteresis. From the thickness aspect, it is shown that as the thickness of the TLCs sample increased, the shifting on the peak temperature between the heating and cooling curve been reduced which indicate less prominent hysteresis occurrence. Therefore, optimum thickness and microencapsulated TLCs can reduce the occurrence of hysteresis on the TLCs.

**Keyword:** TLC; Hysteresis; Microencapsulation; Film thickness