

Luster measurement of pearl by UV-Vis reflectance spectroscopy

Pearl is an organic gemstone widely popular due to its unique color and luster difference from other gems. Its chemical composition is mainly composed of calcium carbonate (CaCO_3) more than 80 %, conchiolin 10 % to 14 % and water 2 % to 4 %. One of the factors determining the quality and price of pearl is the luster. The different lusters of pearls could be related to the different CaCO_3 phases in their structures, i.e. aragonite, calcite and vaterite [1]. In 1934, Hunter developed a glossmeter to measure light specularly reflected at 45° to the surface normal. He determined six different visual criteria for measuring gloss. Luster was defined as the ratio of specularly reflected light and that diffusely reflected normal to the surface. In practice, luster may be interpreted as relative brightness of specularly and diffusely reflecting areas [2]. However, the luster measurement method is related to the flatness of the measurand. Due to the roundness of pearl, we measured the luster of pearl samples by a portable UV-Vis spectrophotometer with an integrating sphere. The luster was calculated from the difference of CIELAB lightness measured by specular included and specular excluded geometries.

Key words: Pearl luster, Gloss measurement, UV-Vis spectroscopy, CIELAB

[1] Monarumit N, Noirawee N, Phlayrahan A, Promdee K, Won-in K and Satitkune S 2016 J. Appl. Spectrosc. 83 298-301

[2] Hanson A R 2006 Measurement Good Practice Guide No.94: Good Practice Guide for the Measurement of Gloss (Middlesex: NPL)

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