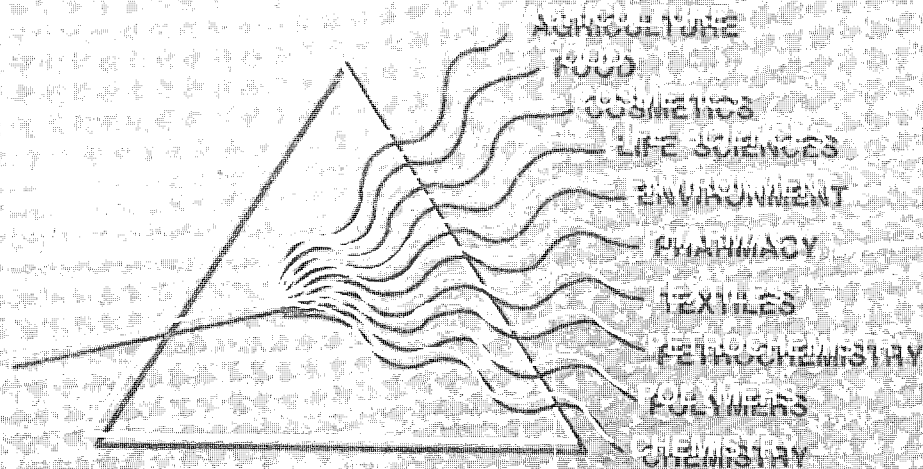


혈액중 non-invasive hematocrit 분석

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Non-invasive hematocrit measurement

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Wavelength selection and prediction algorithm for determining hematocrit are investigated. A model based on the difference in optical density induced by the pulsation of heart beat is developed by taking approximation of Twersky's theory on the assumption that the variation of blood vessel size is small during arterial pulsing[1]. A device is constructed with a five-wavelength LED array as light source. The selected wavelengths are two isobestic points and three in compensation for tissue scattering. Data are collected from 549 out-patients who are randomly grouped as calibration and prediction sets. The range of percent hematocrit was 19.3~51.8. The ratio of the variations of optical density between systole and diastole at two different wavelengths is used as a variable. We selected several such variables that show high reproducibility among all variables. Multiple linear regression analysis is made. The relative percent error is 8% and the standard deviation is 3.67 for the calibration set. The relative % error and standard deviation of the prediction set are 8.2% and 3.69 respectively. We successfully demonstrate the possibility of non-invasive hematocrit measurement, particularly, using the wavelengths below 1000nm.

Figure 1 : Determination of hematocrit : Calibration set and prediction set and residual of prediction with three variable.

Reference

1. KJ Jeon, SJ Kim, KK Park, JW Kim, G Yoon, "Non-Invasive Total Hemoglobin Measurement", *J. Biomed. Opt.* 7(1), 45-50 (2002).

Application of NIR technology for refinery and petrochemical process in SK

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