

INTISARI

INSPEKSI CAIRAN MENGGUNAKAN METODE PENCITRAAN FLUORESENSI DENGAN INDUKSI LASER DIODA TERMODULASI

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Teknik *diode laser induced fluorescence* (DLIF) untuk identifikasi pemalsuan *olive oil* dengan *mineral oil* telah diinvestigasi. Identifikasi pemalsuan konsentrasi *olive oil* diamati dari tingkat sebaran intensitas. Namun, sinyal kontinu laser dioda untuk inspeksi cairan fluoresensi dapat menimbulkan efek *saturation* atau efek *photo-damage*. Sistem *modulated diode laser induced fluorescence imaging* (MDLIFI) didesain untuk menghindari efek tersebut sehingga dicapai peningkatan fluoresensi secara signifikan. Sistem ini dapat menghasilkan sinyal kontinu dan sinyal modulasi frekuensi rendah 100 Hz – 1000 Hz pada laser dioda 532-nm. Intensitas fluoresensi pada sampel yang berbeda diukur menggunakan kedua tipe sinyal tersebut. Hasil menunjukkan bahwa intensitas fluoresensi yang dibangkitkan menggunakan induksi laser dioda 532-nm sinyal modulasi frekuensi lebih tinggi. Intensitas fluoresensi maksimum dicapai ketika sampel diinduksi pada frekuensi 200 Hz. Hasil identifikasi pemalsuan *olive oil* dengan *mineral oil* menunjukkan bahwa linearitas dan koreksi *error* antara fluoresensi dan konsentrasi cukup baik. Berdasarkan analisa statistik, hal tersebut diperlihatkan dari koefisien determinasi R^2 lebih besar dari 0.95 dan root mean square error (RMSE) dibawah 2%.

Kata kunci : Fluoresensi, *Laser induced-fluorescence*, deteksi portabel, laser dioda termodulasi.

ABSTRACT

LIQUID INSPECTION USING FLUORESCENCE IMAGING METHOD WITH MODULATED LASER DIODE INDUCTION

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The diode laser induced fluorescence (DLIF) technique for determining the adulteration of olive oil by mineral oil was investigated. The identification of concentration adulteration is observed from the level of fluorescence intensity distribution. However, Continue wave diode laser can cause saturation and photo-damage effects. The modulated diode laser induced fluorescence imaging (MDLIFI) system is was designed to avoid the effects so that achieved fluorescence significantly enhacement. The system can produce continue wave signal and low frequency modulation signal 100 Hz – 1000 Hz in range 100 Hz. Fluorescence intensity of different sample were measured using continue and modulation signal of 532 nm diode laser. The result show that the intensity signal of fluorensence generated using modulation frequency of 532 nm diode laser is a higher. The maximum intensity of fluorescence is achieved when the modulation frequency is 200 Hz. the identification result of adulteration oilve oil by mineral oil shows that the linearity and error correction between fluorescence and concetration is good. Based on statistical analysis, it is shown from determination coefficient R^2 greater than 0.955 and root mean square error (RMSE) less than 2 %.

Keywords : Fluorescence. Laser-induced fluorescence. Portable detection.
Modulated diode laser