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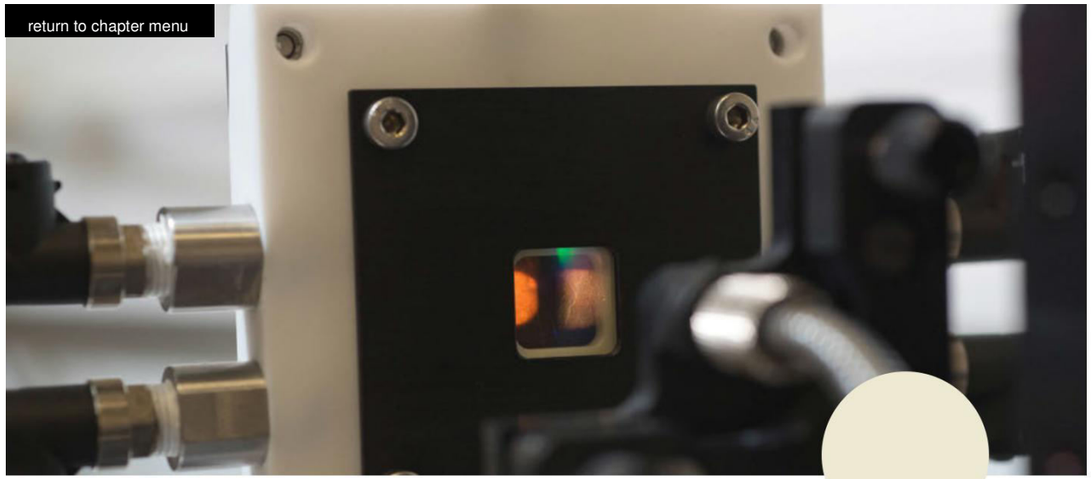

An Automated Measurement Stand for the Reflection of a Polarized Visible Light from a Diffractive Chip

[application areas]

The real time evaluation of the changes in the refractive index of solutions with different concentrations; studies of changes in biological media.

[year of invention] 2011

[authors]

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Dr. Tomas Tamulevičius,
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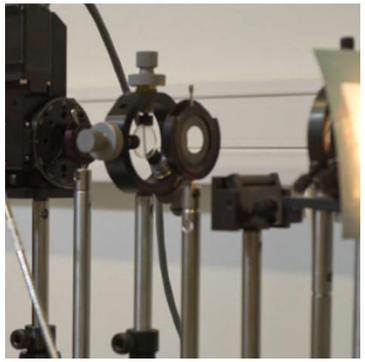
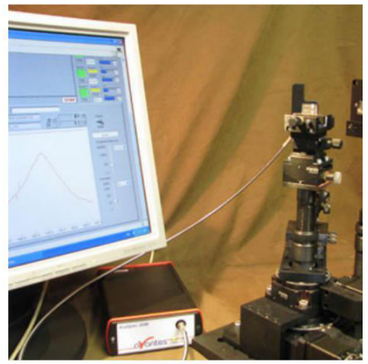
[technological readiness level]

A prototype.



[features, technical specifications]

Illuminating a diffractive chip by a white polarized light (a regular submicrometric structure produced in a dialectric coating on a fused silica base) shows peaks in the reflectance spectra, whose position and amplitude is sensitive to



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the refractive index of the environment which comes into contact with the diffractive chip. Measurements are made on an automated measurement stand controlled by a single program which allows to select measurement geometry, manage polarization selection, and perform the selection and analysis of reflectance spectra during the process. The effective refractive index varies in the analysed solution due to changes in concentration, particle size, or biological processes, the changes are immediately displayed in the application. Depending on the settings, measurements may be performed every few dozen milliseconds. The method is sensitive to changes of 10^{-4} refractive index. The temperature of the measurement cell is maintained by using a thermoelectric thermostat which eliminates the effect of temperature on measurement outcomes. The measurement stand was verified by measuring solutions with known concentrations and examining the interaction between cells and antibiotics.

[novelty]

The device is unique in that it uses a white light rather than a laser radiation and it also allows changing the measurement angle, allowing to select the spectral range of the examined refraction index and to also adjust sensitivity.

[what are we looking for in this stage of development?]

Funding for further research and completion of the prototype; partners from scientific institutions for joint research.

[patenting]

Getting ready for patenting.

[commercialisation] Yet to try.

[alternatives]

Corning®Epic®system, Axela sensors, OWLS sensors.

[notes]

T. Tamulevičius, R. Šeperys, M. Andrulevičius, V. Kopustinskas, Š. Meškinis, S. Tamulevičius, V. Mikalayeva, R. Daugelavičius // Application of holographic sub-wavelength diffraction gratings for monitoring of kinetics of bioprocesses // Applied Surface Science, Volume 258, Issue 23, 15 September 2012, Pages 9292–9296

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