

OPTIMIZATION OF OPTICAL MODULE PERFORMANCE FOR REAL TIME DIALYSIS MONITORING DEVICE: CHOICE OF SENSOR OPTICAL COMPONENTS AND DATA ACQUISITION SEQUENCE

A real time dialysis monitoring device is under development, which uses four different UV wavelengths and the measurement of both UV absorbance and fluorescence intensity. The optical module of this device however has shown very low output signals in absorbance, fluorescence and reference channels.

Different optical components were tested and two new photodiodes and a phototransistor were chosen, which showed a substantial increase in the output signal. An increase of 104 times was seen for the reference and absorbance channel. Fluorescence channel output signal was seen to increase even more – 107 times. These output signals are strong enough for further signal processing and analysis. Optimization of a data acquisition sequence was needed because new optical components were used. The rise time for the phototransistor is much longer than previous photodiodes, which caused the data acquisition rate to slow down. A sampling rate of each channel dropped from 300 Hz to 25 Hz. Measured output signals and optimized data acquisition sequence are the base for further optimization of the device electronic boards.

This thesis is written in English language and is 39 pages long, including 7 chapters, 18 figures and 5 tables.