Electronic Supplementary Material (ESI) for RSC Advances.

Supplemental Information

Real-Time Detection of Telomerase Activity in Cancer Cells using Label-Free Electrochemical Impedimetric Biosensing Microchip

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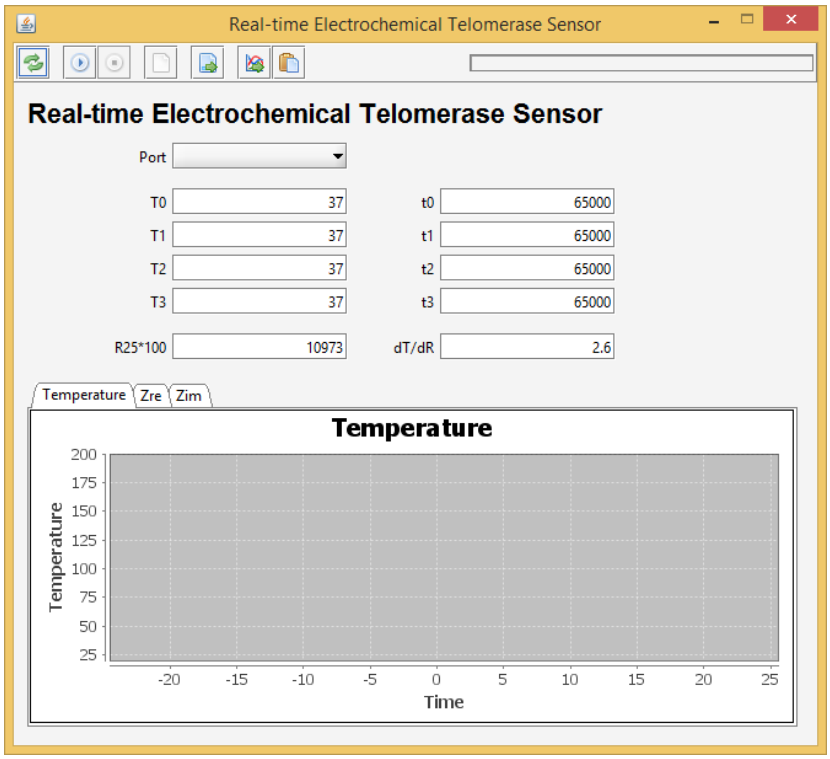

Figure SI1 – Software designed in-house in Java to control the temperature for the telomerase incubation during real time measurements.

The software was connected to the temperature controller through a TTL-232R-3V3 USB-to-UART cable (FTDI) to a PIC24FJ32GB002 (Microchip) which handled all the signal processing. Using a high input impedance operational amplifier TLC2264 (Texas Instruments) as a buffer, and a 24-bit digital-to-analog converter (DAC) ADS1210 (Texas Instruments), we built an inexpensive high speed/high resolution temperature controller. Depending on the biosensor design, a lower resolution DAC may also be used, which can decrease the total cost of the device. In addition, the change of the ADS1210 to an ADS1211, for example, provides an alternative way to extend the device and manage additional biosensors with one controller. Also, a high-quality, low-noise voltage reference for the resistance temperature detector (RTD) was achieved using a high precision resistance (Vishay Foil Resistors) with 0.01% tolerance, together with a REF02BP (Texas Instruments) +5 V precision voltage reference. Finally, an optocoupler

was used to isolate the electronic circuit from the solid state switch 2SK2617LS (Sanyo) that controlled the heater.

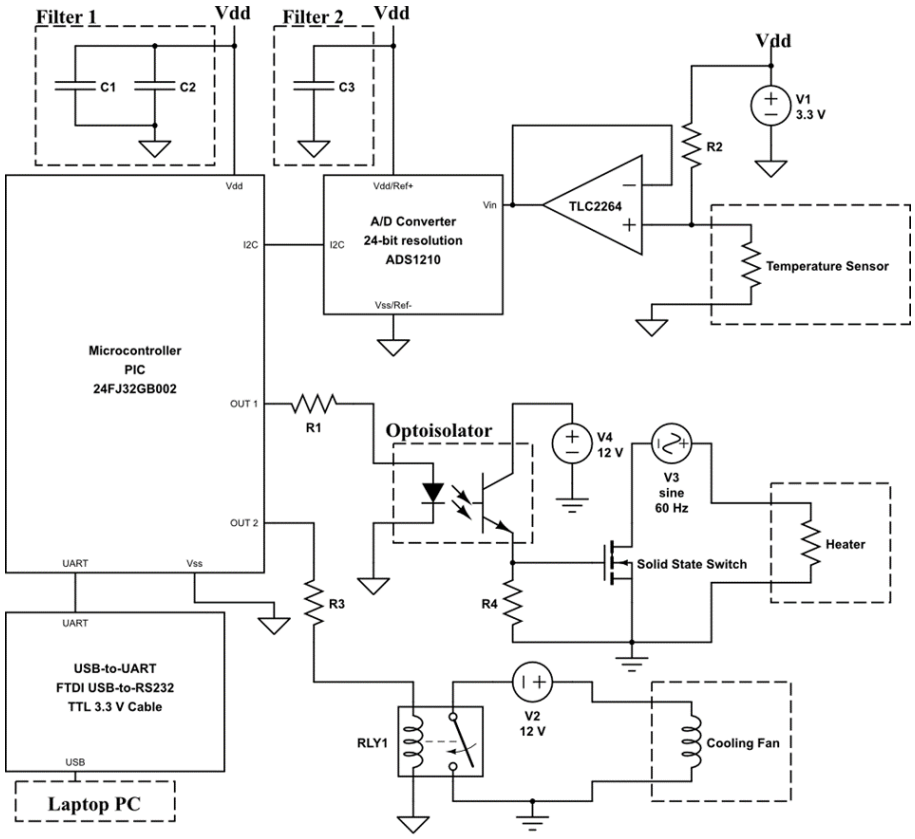

Figure SI2 – Electronic circuit scheme for the temperature controller of the biosensor system shown in Figure 2. This circuit was done using basic electronic components (e.g. resistors, capacitors, microcontrollers, etc.)