Abstract

Implantable Blood Pressure Sensors with an Analogic Thermal Drift Compensation †

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Abstract: Implantable pressure sensors represent an important part of research activity in laboratories. Unfortunately, their use is limited by cost, autonomy and temperature-related drifts. The cost of use depends on several parameters, in particular the low battery life and the need for miniaturization to be able to implant the animals and monitor them over time that is long enough to be physiologically relevant. This paper study the possibility to reduce the thermal drift of implantable sensors. To quantify and compensate for thermal drift, we have developed the equivalent model of the piezoresistive probe by using the cadence software. Our model takes into account the temperature (34–39 °C) and also the pressure (0–300 mmHg). We were thus able to identify the source of the drift and thanks to our model we were able to compensate for it thanks to compensation circuits added to the conditioning circuits of the sensor. The maximum relative drift of the sensor is (0.1 mV/°C)/3.6 mV (2.7%), a drift of the conditioning circuit is (0.98 mV/°C)/916 mV (0.1%) and the whole is (13.4 mV/°C)/420 mV (32%). The compensated sensor show a relative maximum drift of (0.371 mV/°C)/405 mV (0.09%). The output voltage remains stable over the measurement temperature range.

Keywords: thermal drift; cadence simulation; blood pressure sensors; analogic compensation; piezoresistive