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# Fabrication process for inexpensive, biocompatible and transparent PCBs. Application to a flow meter

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**Abstract**

The requirements of the Printed Circuit Boards (PCBs) are gradually more demanding due to the advances on the technology of many fields. Some of these requirements are biocompatibility and transparency for biological/biomedical applications. In this paper, the fabrication of inexpensive, biocompatible and transparent substrate for rapid prototyping is reported. This substrate is intended to be used as PCB because of their similarities. It is composed of polymethylmetacrylate (PMMA) as substrate, aluminum (Al) as conductive material and a light cure acrylic biocompatible adhesive to perform the bonding between the aluminum and the substrate. In addition, a solder mask layer of the same adhesive is performed to cover the aluminum tracks. The process is easy to perform and inexpensive if taking into account the used materials and the facilities. In this respect, a conventional UV light source is needed. Taking into account these requirements, a rapid prototyping of a PCB-based flow meter is developed as an example of application. This flow meter is fabricated using the proposed PCB substrate. This device is intended to be integrated on transparent and rapid prototyping lab on chip devices for biomedical applications. This integration implies the compatibility of this flow meter with optical sensing of biological samples. The flow sensor is composed of a microheater with a range of temperature from room temperature up to 100 $^{\circ}C$. The fabricated microheater is used as NTC resistor to develop the highly integrated flow sensor. The proposed device has a sensitivity of 450 $\mu$V/($\mu$L/min) and a normalized sensitivity of 450 ppm/($\mu$L/min) for a driven current of 0.6 A. The range of flow rate of the fabricated device lies between 0 and 450 $\mu$L/min.

*Keywords:* Printed Circuit Board, Transparent, Biocompatible, Optical