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Design and Fabrication of Heated Microchannels

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The development of lab-on-a-chip and miniature sensors often involves microheaters to carry out reactions and sample preparation on the microscale level. In this paper, we present the design and fabrication of heated microchannels by sputtering a metal film to form a resistive heater. The devices were fabricated on a 6-inch silicon substrate via conventional oxidation, photolithography, chemical wet etching, and metal deposition steps. A surface temperature as high as 360ºC could be attained using an aluminum alloy as the conducting layer. The response time of the heater was short and maximum temperature could be attained within 10–30 s. The heater showed excellent long-term stability under repeated temperature cyclings. A heat transfer model that fits the experimental data quite well is presented. The model can be used to design heated microchannels of desired dimensions.

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