

# A CMOS Thermally Isolated Gas Flow Sensor

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Fabrication of a thermally isolated gas flow sensor using standard CMOS technology is presented. The electrical heater element and the resistor to measure the gas flow are formed using the polysilicon layers, sandwiched by the field oxide and CVD oxides, available in the CMOS process. To achieve thermal isolation, an anisotropic etching is performed to create a cavity below the membrane sandwiching the heater and sensor elements. Only 17.1 mW of electrical power is required to raise the temperature of the membrane above 300°C. The feasibility of this device gas flow measurement is demonstrated.

## 1. Introduction

Measurement and control of gas flow is important in many domestic and industrial applications. Usually, accurate measurement is determined from the cooling of a hot wire due to the gas flow.<sup>(1)</sup> In order to increase accuracy and portability and reduce power consumption, miniaturised gas flow sensors have been fabricated; recently silicon micromachining techniques have been used to fabricate such sensors.<sup>(2-7)</sup> These micro-gas flow sensors were fabricated by a custom fabrication technology exclusively developed for this purpose.

In our research, we have found that standard CMOS technology is capable of producing several micromechanical structures for sensor applications.<sup>(8-11)</sup> This technique has been adopted to fabricate and test a thermally isolated gas flow sensor