As mentioned above, the underlying silicon nitride is partially removed in the process steps described in FIG. 2B using photolithography and selective plasma etching. These are well known techniques. Reference may be made, for example, to a text by Roy A. Cole Colclaser entitled "*Microelectronics Processing and Device Design*", published by John Wiley and Sons in 1980, Chapter 2. Various techniques can be used to apply a platinum film. Preferably, a film about 100 nm thick can be applied by a sputtering deposition process in argon after an ion milling step, the latter removing approximately 20 nm of the top silicon nitride film to improve adhesion of the platinum to the substrate. If desired, a film of titanium/platinum composition consisting of a 10 nm titanium layer and a 100 nm platinum layer can be applied using an electron beam deposition process.

The resistors are delineated by lithography and wet etching, as mentioned above. They then may be annealed at 600° C. in nitrogen to stabilize their resistances and temperature coefficients. The sensor plates then can be coated as mentioned above, which is followed by annealing at about 500° C. Further information on sputtering and other processing steps related to the application of the catalyst can be found in the reference publication by Roy Colclaser in Chapter 6.

During the process step described with reference to FIG. 2F, the bulk silicon material is etched. The silicon nitride coating **74**, which is applied in the processing steps described with reference to the FIGS. 2A and 2B, protects the polysilicon plate **16** from being etched during the final etching operation for the bulk silicon material using potassium hydroxide.

The foregoing detailed description of a preferred embodiment of our invention is intended to illustrate the inventive features of the invention. It will be recognized by persons skilled in the art, however, that modifications, additions and substitutions may be made in the embodiment described without departing from the scope of the invention.

Having described a preferred embodiment of our invention, what we claim and desire to secure by U.S. Letters Patent is:

We claim:

1. A microcalorimeter to detect concentration of combustible gases in the exhaust gas of an internal combustion engine comprising a pair of temperature sensing elements, each element having a polysilicon plate, a silicon frame, at least one cavity in said frame, said polysilicon plate being supported by said frame, each plate being disposed over a frame cavity;

a polysilicon layer mounted over said base and surrounding said plates;

polysilicon support arms joining said plates to said polysilicon layer thereby supporting said plates and positioning them to define gas flow passages through said sensor and to thermally isolate said plates from said layer;

electrical resistors on each plate defining a resistance thermometer and a heater resistor; and

catalyst material disposed on at least one side of one of said plates whereby the heat of combustion of said combustible gases can be detected.

2. The microcalorimeter as set forth in claim 1 wherein said resistors are mounted on said polysilicon layer and extend over said support arms to one surface of each of said polysilicon plates, said heater resistor for each plates surrounding said resistance thermometer for each plate whereby each sensor element is uniformly heated.

3. The microcalorimeter as set forth in claim 1 wherein said sensor support and said planar bodies are covered with a silicon nitride passivation.

4. The microcalorimeter set forth in claim **3** wherein said resistors and said support are covered with a common silicon nitride passivation.

5. The microcalorimeter as set forth in claim 1 wherein said plates and said polysilicon layer are covered with a silicon nitride layer, said silicon nitride layer being disposed between said polysilicon layer and said silicon frame.

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