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this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

We claim:

1. A differential gas combustible microcalorimeter sensor 5 comprising:

a substrate which comprises:

a silicon frame,

a first reference membrane disposed on said silicon frame, and 10

a second membrane disposed on said silicon frame, said second membrane being positioned such that said second membrane is thermally isolated from said first reference membrane;

a first and second temperature measuring devices, the first 15 temperature measuring device being disposed on said first reference membrane and the second temperature measuring device being disposed on said second membrane; and

a sol-gel processed catalytic layer disposed on said second 20 temperature measuring device, wherein said first and second temperature measuring devices provide a measurement of the additional heat generated by the catalytic layer to provide a means of calculating the temperature fluctuation in a combustible gas that comes 25 into contact with the sensor.

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2. The sensor of claim 1, wherein said sol-gel processed catalytic layer comprises:

a sol-gel processed washcoat, wherein the washcoat is selected from the group consisting of alumina, silica and mixtures thereof; and

a plurality of sol-gel processed catalytically active metal particles deposited on said sol-gel washcoat.

3. The sensor of claim 2, wherein said catalytically active metal particles are noble metals selected from the group consisting of platinum, palladium, silver, gold, ruthenium, rhodium, osmium, iridium, and mixtures thereof.

4. The sensor of claim 1, wherein said sol-gel processed catalytic layer comprises:

a sol-gel processed washcoat, wherein said washcoat is selected from the group consisting of alumina, silica and mixtures thereof; and

a plurality of catalytically active metal particles deposited on said sol-gel processed washcoat.

5. The sensor of claim 4, wherein said catalytically active metal particles are noble metals selected from the group consisting of platinum, palladium, silver, gold, ruthenium, rhodium, osmium, iridium, and mixtures thereof.

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