We Claim:

1. A transducer comprising:

a barrier layer having an average thickness of about 50 nm to about 50 μm;

an active sensing layer in contact with at least two electrodes, wherein said active sensing layer has a thickness of less than about 1,000 nm and is selected from the group consisting of carbon nanotubes, carbon nanotube fabrics, amorphous carbon films, graphite, graphene, pyrolytic carbon, carbon fibers, carbon black, silicon, conductive polymers, fullerenes carbon soot, and composites and mixtures of the foregoing; and

a dielectric layer between said active and barrier layers and having first and second sides, said at least two electrodes both being adjacent said dielectric layer second side, said transducer being a resistive transducer.

2. The transducer of claim 1, wherein said barrier layer comprising a material selected from the group consisting of metals, metal oxides, metal nitrides, semiconductors, glass, organic polymers, and mixtures of the foregoing.

3. The transducer of claim 1, wherein said dielectric layer comprises a material selected from the group consisting of non-conductive polymers, non-conductive photoresists, non-conductive ceramics, non-conductive metal nitrides, non-conductive metal oxides, non-conductive metal composites, and mixtures thereof.

4. The transducer of claim 1, said active sensing layer having first and second sides, with said active sensing layer first side being against said dielectric layer second side.

5. The transducer of claim 1, wherein said barrier layer has first and second sides, said dielectric layer being adjacent said barrier layer second side, and further comprising a substrate against said barrier layer first side.

6. The transducer of claim 5, wherein said substrate is selected from the group consisting of metals, metal oxides, metal nitrides, semiconductors, glass, paper, organic polymers, and mixtures of the foregoing.

7. The transducer of claim 3, further comprising a signal enhancement layer against said active sensing layer second side.

8. The transducer of claim 7, wherein said signal enhancement layer comprises a material selected from the group consisting of non-conductive polymers, non-conductive photoresists, non-conductive ceramics, non-conductive metal nitrides, non-conductive metal oxides, non-conductive metal composites, and mixtures thereof.

9. The transducer of claim 1, wherein:

said barrier layer comprises a material selected from the group consisting of metals, metal oxides, metal nitrides, semiconductors, glass, organic polymers, and mixtures of the foregoing; and

said dielectric layer comprises a material selected from the group consisting of non-conductive polymers, non-conductive photoresists, non-conductive ceramics, non-conductive metal nitrides, non-conductive metal oxides, non-conductive metal composites, and mixtures thereof.

10. The transducer of claim 1, said transducer having a response time of less than about 50 msec and a fall time of less than about 100 msec under atmospheric conditions.

11. A sensor comprising a transducer according to claim 1.

12. The sensor of claim 11, further comprising a controller unit operably coupled with said transducer.

13. The sensor of claim 11, said controller unit being operably coupled with said transducer so that the change in resistance encountered by said transducer upon exposure to an analyte can be detected and analyzed by said controller unit.

14. The sensor of claim 12, wherein:

said barrier layer comprises a material selected from the group consisting of metals, metal oxides, metal nitrides, semiconductors, glass, organic polymers, and mixtures of the foregoing;

and

said dielectric layer comprises a material selected from the group consisting of non-conductive polymers, non-conductive photoresists, non-conductive ceramics, non-conductive metal nitrides, non-conductive metal oxides, non-conductive metal composites, and mixtures thereof.

15. The sensor of claim 11, said transducer having a response time of less than about 50 msec and a fall time of less than about 100 msec under atmospheric conditions.

16. A method of detecting existence of a condition, said method comprising:

introducing a transducer into an environment where said analyte might be present, said transducer comprising:

a barrier layer having an average thickness of about 50 nm to about 50 μm;

an active sensing layer in contact with at least two electrodes, wherein said active sensing layer has a thickness of less than about 1,000 nm and is selected from the group consisting of carbon nanotubes, carbon nanotube fabrics, amorphous carbon films, graphite, graphene, pyrolytic carbon, carbon fibers, carbon black, silicon, conductive polymers, fullerenes carbon soot, and composites and mixtures of the foregoing; and

a dielectric layer between said active and barrier layers and having first and second sides, said at least two electrodes both being adjacent said dielectric layer second side; and

observing whether said transducer indicates the existence of the condition, wherein said existence is indicated by a change in resistance.

17. The method of claim 16, wherein said condition is one selected from the group consisting of presence of an analyte, change in temperature, or both.

18. The method of claim 17, wherein said analyte is selected from the group consisting of humidity, gas, airflow, VOCs, and combinations of the foregoing.