

S2.4.1 Low Cost Activated Carbon Filter Failure Detection with SPEC Sensors

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Activated Carbon filters are used to adsorb a broad range of gases in that can affect the health and productivity of humans. Unfortunately, these same activated carbon filters have a limited adsorbing capability and they reach their end-of-life when they are saturated from adsorbing the bad vapors. At that point, quick replacement is the best way to resolve the problem.

A useful solution would be a low power, low cost, small yet sensitive gas sensor that could detect when the activated carbon filter was reaching or had just passed saturation. To be most effective, the sensor would have to be broadly sensitive to the various gases that activated carbon is chosen for filtering. For example: organic compounds, inorganics compounds, chlorinated hydrocarbons and, of course, general odors from humans, animals, foods, cooking and waste process.

Until recently the most common solutions available were:

- TVOC sensors that detected a broad range of gases but required significant power to make a measurement
- Electrochemical systems which consumed very little power, but were large and typically designed to detect specific gases.

SPEC Sensors has developed a way to shrink the low power consumption, high performance characteristics of the large electrochemical sensors into a size that can easily be integrated into today's activated carbon filter products. In addition, SPEC Sensors has made two different non-selective sensor designs that are sensitive to low level concentrations for many gases of concern to activated carbon filter users.

The sensors are made in a layer process, printing the active elements and making sheets at a time that are later diced and packaged much like the semiconductor chip process.