INFRARED FILTERS USED IN MONITORING AIR POLLUTION

Air pollution is the greatest environmental risk to public health. Across the UK, an annual average of 5.6% of deaths are attributed to long-term exposure to air pollution – roughly 30,000 a year.

The problem is that when you visualise air pollution you may think of the great smog of London or a Dickens novel that paints a picture of a blanket of smoke. But just because we can't see visible clouds of pollution doesn't mean it isn't affecting us. Removing pollution once it's in the air would be like trying to unbake a cake and return it to its base ingredients.

Technology and legislation, such as the 1956 Clean Air Act, have significantly reduced the lethal smog, caused by domestic and industrial coal burning.

While levels of air pollution have been falling in recent decades, the UK has been in breach of legal limits for the key pollutant since 2010 and the government does not expect to fully meet these goals until after 2030.

Add to that the possibility that energy prices will likely increase the use of wood burners, and difficulties changing fertiliser use in farming which causes ammonia emissions, and further exacerbation of the problem is to be expected.

The Fourth Industrial Revolution

Recently published data from DEFRA shows 333 out of 383 local authority areas in the UK recorded potentially dangerous levels of PM2.5 pollution in 2020 above WHO's recommended limits.

The overwhelming majority of air pollution's health impact is coming from burning fossil fuels. In a mix of contributors, transport and industry and the burning of biomass for cooking are common culprits.

The monitoring of emissions from stationary sources of pollution, such as power stations, manufacturing plants, and other industrial facilities, is essential for a whole host of reasons. Not only does it allow the site operator to ascertain the concentration of various gases they are emitting into the atmosphere, but it also enables the relevant authorities to check whether the site is complying with its legal obligations.

Efforts to curb industrial methane emissions – anthropogenic methane is the most potent greenhouse gas on earth – continue to gather pace, its monitoring, detection, and mitigation are considered 'low-hanging fruit' in our efforts to alter the course of climate change.

CO_2 and CH_4 are classified as greenhouse gases due to their ability to strongly absorb infrared light emitted from the Earth's surface. This effectively traps the infrared light emitted from Earth as heat and could contribute to the warming of our atmosphere.

Fortunately, the infrared absorbing property of CO_2 and CH_4 can be exploited in the form of infrared spectroscopy to determine the atmospheric concentrations of these gases.

Infrared emitters within the sensor generate beams of IR light. And, having passed through a sampling chamber, a filter in front of the detector blocks out light that is not at the desired wavelength while the detector measures the intensity or attenuation. This is then used to determine the concentration based on the absorption of IR radiation as it passes through a volume of the gas.

Chief among their benefits are the fast response times and accurate results, while not requiring external gases to operate. Continuing advances in technology have also resulted in detectors that continuously monitor combustible gases and vapours within the lower explosive limit and provide alarm indications. These can be deployed within oxygen-deficient or enriched areas, require little calibration, and are immune to sensor poison, contamination, or corrosion.

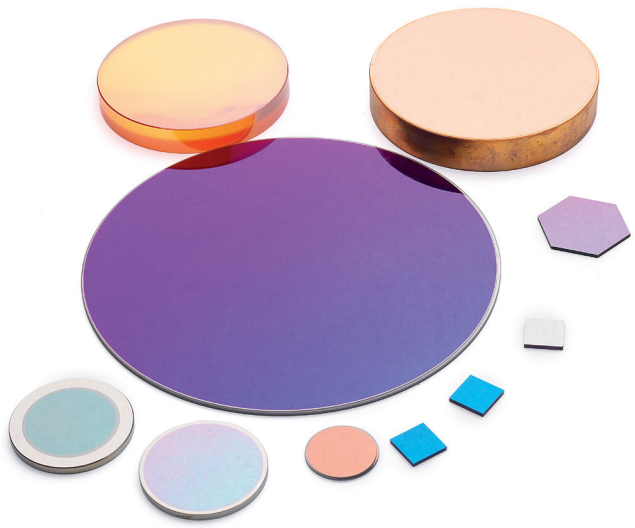
Plant owners who must abide by certain regulatory frameworks, or more specifically major and growing sensor manufacturers, are seeking out high-performance filters at competitive prices.

We can do more by working together

It remains a hyper-local issue and can vary from place to place. It requires a multi-dimensional push, backed by deeper understanding. And that is where data and monitoring come in. For an urgency to be established about cleaning up an area's air, it must first be considered a problem. Benchmarks must be established. People and businesses must take responsibility.

Real-time data and monitoring stations, whether in the community or established by businesses, meaning there should be no more soupy skies with a shroud of factory emissions.

Monitoring and data enable action planning, goal setting, in some cases culpability, and the attraction of funding and research and development. Monitoring can also play into a raised public profile in the press and media.



The issue remains that we need to find ways to make pollution visible as a public health issue. Understanding air quality, wherever that might be, will only help facilitate bright ideas for transport, industry, and energy.

The problem requires determined political engagement and action at a local and national level, and it's not always something that people can see and perceive as a priority. The growing availability of low-cost air-quality monitors, and increased awareness of local air quality thanks to campaigns, could help to change that.

The internet and smartphones have led to a proliferation of air pollution information systems – but this must be framed around the idea that information will help people to behave differently.

Proper communication with the public has also been sorely lacking. People want information on how and what they can do about it. Any new air quality information system needs to be based on what people are exposed to in their localities, including real-time variations.

Helping people see the invisible

The recent warning from The National Audit Office was stark, existing policy measures will not be enough to meet most of the government's air quality targets by 2030.

The problem remains that finding out about air quality problems in your area is not easy, and the government is not communicating effectively on the need for solutions such as charging polluting vehicles to drive in clean air zones.

Air pollution measurement instruments serve multiple purposes: publishing dust information online to update the public and issuing cautionary statements if required. Having this data in real-time can ensure that the right people act when increased levels are reported and control measures can be put in place and continuously evaluated.

Environmental monitoring and protecting against potentially dangerous conditions can be difficult to manage without reliable data streams and monitoring of a site perimeter that gathers environmental data. For this reason, more and more companies are turning to boundary monitoring technology to measure the level of risk and make sure they adhere to environmental limits and guidelines, while also protecting against health hazards.

Aside from being extremely detrimental to the human body, air pollution may also influence the ecosystem, causing phenomena such as acid rain and lower crop yields, as well as reproductive failure and illnesses in wildlife species.

The logical first step toward resolving this air crisis would be to make much more real-time air quality data available to the general public and increase air quality data transparency, as well as initiatives to educate people on the long-term consequences of breathing in polluted air. People can take a variety of precautionary actions to safeguard themselves and others around them if they are aware of the severity of the pollution they are inhaling.

And that's why the Umicore infrared filters are used by a selection of the industry's major players. They move seamlessly from our state-of-the-art production facility in the UK, and into a range of ready-now technologies that are helping customers meet their health, safety and sustainability goals.

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