



We Are Open and Accepting/Shipping New Orders

2B Technologies is playing a role in the fight against COVID-19. We manufacture the ozone monitors used in "ozone disinfection robots" that destroy viruses and bacteria by use of gas-phase ozone. Our instruments are also used in other areas important to public health, such as food safety and water treatment. As a result, we are designated as an essential business. We remain open and are able to fulfill orders for any of the monitors and calibrators in our product lineup. We have adjusted our procedures to protect the health and safety of our employees and the community at large, which remains our top priority. We wish everyone the best in these challenging times.

Case Study

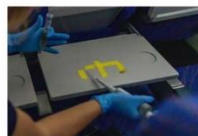
How Ozone Can Help the Airline Industry During the Pandemic

2B Tech Ozone Monitors Play a Role in New Airliner Disinfection Method

The airline industry has been hit hard during the COVID-19 pandemic, and a key component of restoring the public's confidence in air travel is the development of effective methods to disinfect the close quarters of the airline cabin. Currently, the airlines are using large cleaning crews to hand-clean the aircraft interiors each night. It's a laborious process that takes over an hour per plane. But now a partnership of academia and the private sector is demonstrating how ozone gas can make the process both easier and more thorough in reaching all the nooks and crannies of an airliner.

Energy Quest Technologies Inc., the University of Arizona, and the Pima Air & Space Museum are developing the technology and testing the approach. The idea capitalizes on two facts: First, [ozone is extremely effective at deactivating viruses](#). Second, by necessity and design, an airliner is easy to seal up.

A [news story and video](#) describes the project. Virus samples are placed throughout the study's aircraft, which is a decommissioned Boeing 737 offered up by the museum. Then an ozone generation system supplies ozone to the sealed, unoccupied cabin using the aircraft's air conditioning system. A 2B Technologies [Model 106-L Ozone Monitor](#) (shown at 1:14 in the [video](#)) provides measurements to ensure desired ozone concentrations are reached, and also enables researchers to see when ozone falls to safe levels at the end of the fumigation.



Ozone is pumped into an unoccupied aircraft cabin to disinfect the surfaces. Virus samples placed throughout the aircraft are deactivated after a ~90-minute exposure, with a 2B Tech Model 106-L Ozone Monitor providing measurements throughout. [Photo Credit: Pima Air & Space Museum and Ramon Purcell.]

So far, the results are impressive. "We can get hospital-grade sterilization in about 90 minutes," said Dewey Benson, President of Energy Quest Technologies. "We're talking about 99.9999 percent reduction in virus." The virus is deactivated to 99.9% even in hard-to-reach areas between seat cushions and seat pockets, areas that cannot be reached effectively by cleaning crews. By using the air conditioning system as the input for the ozone, the duct work of the aircraft is also sterilized.

Several airlines and the Air Force are interested in the new approach, which would not only be more effective, but would be more economical for the struggling industry.

A [more detailed video](#) is available from Energy Quest Technologies (2B Tech Ozone Monitor at 3:22).

Aircraft Sterilization Story
and Video

2B Tech's Lineup for Ozone
Disinfection Applications

Air Pollution News

A Lesser Known Player in the Wildfires/AQ Story

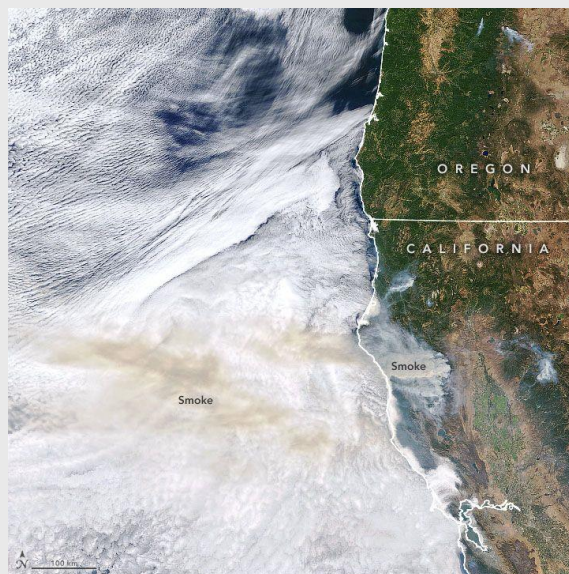
Satellite and Aircraft Data Show More Nitrous Acid in Plumes than Expected

We all know that wildfires make it harder to breathe locally and affect air quality far downwind, even at continental scales. A study in *Nature Geoscience* has shed new light on the unseen chemistry behind those effects and reveals a larger role for nitrous acid (HONO) than previously thought.

Researchers at the Belgian Institute for Space Aeronomy and the University of Colorado Boulder looked at HONO observations from the relatively new TROPOspheric Monitoring Instrument (TROPOMI), launched in 2017 onboard the Sentinel-5 Precursor satellite, and synced them up with aircraft measurements. It was a first for consistent measurements of nitrous acid from space, and an ingenious combination of near-simultaneous satellite and aircraft observations from above and below the plume.

The research showed that HONO was 2 to 4 times higher than anticipated from laboratory studies, and depended on the biome undergoing burning (evergreen forests provided highest levels). The source of the HONO in fire plumes is a complex mix of direct emissions, secondary gas-phase reactions, and reactions on the soot and other particles in the plume.

Once in the atmosphere, HONO is a source of hydroxyl radicals (OH)-- a surprising 60% of the total source of OH in fire plumes worldwide, according to the study. The OH radicals, often called the "atmosphere's detergent," in turn



Winds carry smoke from California fires westward over the Pacific Ocean in September 2020, as viewed by the MODIS instrument onboard the NASA Terra satellite. A new study matched up TROPOMI satellite data and aircraft observations to show that invisible nitrous acid gas in wildfire plumes is higher than expected and affects air chemistry and ozone pollution. (Image credit: Joshua Stevens, NASA/EOSDIS/LANCE/GIBS/ Worldview)

lead to the production of ozone and react with aerosol particles and greenhouse gases. Up to a 7-ppb regional ozone boost can arise from the chemistry, enough to tip the scales above air quality limits in some areas.

[Global nitrous acid emissions and levels of regional oxidants enhanced by wildfires](#), N. Theys, R. Volkamer, J.-F. Müller, K. J. Zarzana, N. Kille, L. Clarisse, I. De Smedt, C. Lerot, H. Finkenzeller, F. Hendrick, T. K. Koenig, C. F. Lee, C. Knote, H. Yu, M. Van Roozendaal, *Nature Geoscience*, DOI: [10.1038/s41561-020-0637-7](#), 2020.

New on Our Website

Sensor and Instrument Packages

Sensors, Monitors Bring the Best of Both Worlds

A [new section](#) of our website is now dedicated to the sensor and instrument packages offered by 2B Tech.

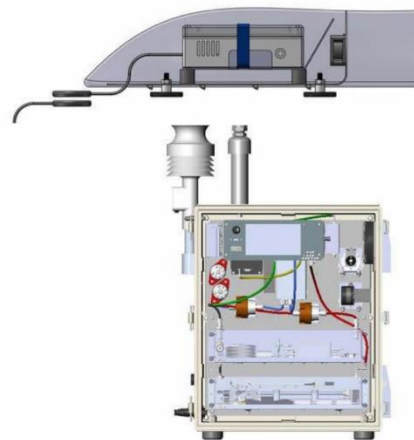
The packages have their origins in our longtime efforts to bring air quality measurement capabilities to students and teachers. The [AQTreks program](#) led to the development of the [Personal Air Monitor \(PAM\)](#), which uses the best available sensors to provide measurements of CO, CO₂, particulate matter, temperature, and humidity at a fraction of the cost of conventional instruments. It wasn't long before the PAM's broader usefulness became clear, and demand for the product led us to add it to our product lineup. We also offer a "Car Topper," which enables the PAM to catch a ride on top of vehicles for mobile measurements.

The [Community Air Monitor](#) expands the suite of measurements to include ozone, by combining the PAM mentioned above with our Model 106-L Ozone Monitor. The weatherproof package can be mounted to light poles or other structures in public spaces, thus enabling "community" measurements.

Key to both the PAM and the CAM is communication of measurements to cell phones, which enables easy access to multiple users simultaneously.

Coming in 2021 is the [AQSync](#), a complete air monitoring package that uses more accurate and sensitive measurements of trace gases to enable "drive-by" calibrations of mobile sensor packages such as the PAM/Car Topper.

We hope you'll check out this new section of our website, located in the "Products" drop-down menu.



Instrument packages offered by 2B Tech include the Personal Air Monitor (PAM) sensor-based package for CO, CO₂, PM, T, and RH; the Community Air Monitor (CAM) that combines a PAM and our Model 106-L Ozone Monitor; the Car Topper that enables mobile measurements using the PAM; and (coming in 2021) the AQSync multi-pollutant package.

Instrument / Sensor Packages

2B Tech Videos

Choosing (and Using!) the Right Ozone Monitor for Your Application

New Videos Describe Our Model 106 Series Ozone Monitor Lineup and Our Data Display Software

Two new videos are available from 2B Technologies. The newest is our video on the [Model 106 Series ozone monitors](#). It describes the different models we offer and can help with decisions about the model that best suits your particular application. A second video explains how to download and use [2B Tech's Data Display software](#), which enables you to acquire and view data from 2B Tech instruments on your computer. Find them in the [Videos section](#) of our website (in the 106 tabs and the Software tab).

2B Tech Videos

2B Tech Research Preview

Slowing Coronavirus Transmission: Relative Humidity Makes a Difference!

Finding Points the Way to Safer School Openings



2B Tech co-founder and Chief Scientist Dr. John Birks and InDevR CEO Dr. Kathy Rowlen have coauthored a paper showing that relative humidity might be the factor that explains some of the mysteries of influenza seasonality--and might also provide schools with another weapon for battling the coronavirus and more safely offering in-person learning during the pandemic.

"Everyone knows" that there is a flu season; it's worse in winter. But why is that? It's not just that people are indoors more. As the paper discusses, relative humidity is lower in the winter indoors, and that causes aerosols to be smaller (longer lived in the air and therefore more transmissible), respiratory viruses such as influenza and coronavirus to be more viable, and people to be more susceptible. This triple whammy makes health professionals especially nervous as the Northern Hemisphere heads into the winter season and schools are in session.

The authors offer a simple one-sentence summary of the implications: "*We should humidify our classrooms now!*" They find that the minimum transmission is at about 50% RH. Commercially available units sufficient for humidifying a typical classroom cost in the range of \$150 USD.

The paper is submitted to the journal *Indoor Air*, but in the interest of getting the information out as widely as possible at this critical time, the authors have made the [preprint of the paper available on ResearchGate](#). They have additionally been talking with several school districts about their findings, and some have taken the suggestion of adding humidifiers to their other measures for reducing the risk of virus transmission.

Preprint: Maintaining Classroom Humidity at 40-60% RH Would Reduce Transmission of Respiratory Viruses, by J.W. Birks and K.L. Rowlen

[2B Tech Website](#)

[Get Quote](#)

[Our Team](#)

[Newsletter Archive](#)

[Helpful Downloads](#)

2B Technologies

2100 Central Avenue, Suite 104 | [Boulder, Colorado USA](#)
303-273-0559 | sales@twobtech.com