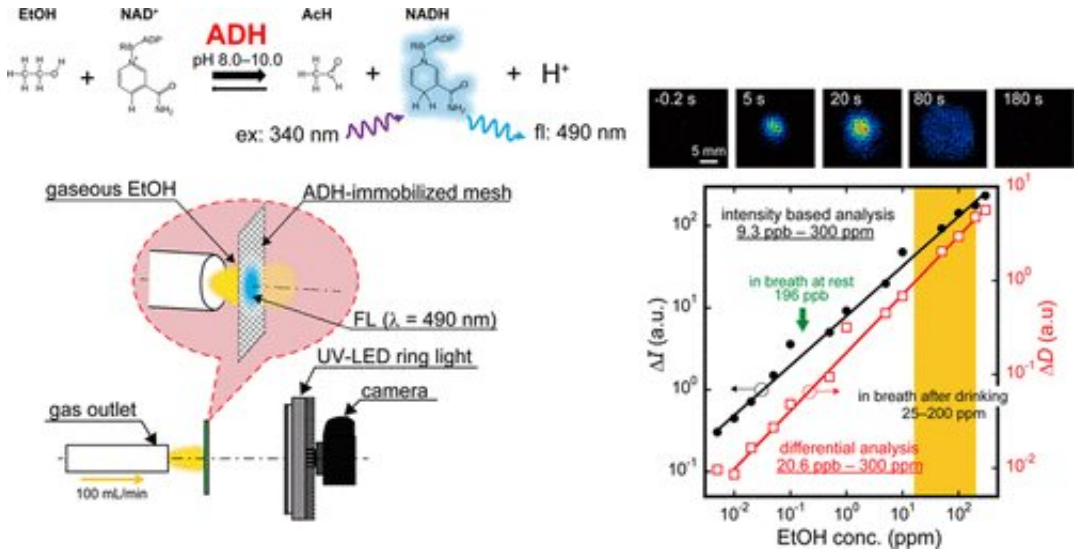
'Sniff-cam' to detect disease

July 31 2019



Credit: American Chemical Society

Having bad breath can mean someone ate a smelly lunch, but it could indicate that the person is sick. Various scent compounds have been linked to illnesses such as diabetes, lung cancer and Parkinson's disease, leading scientists to develop technology that measures these substances. However, the challenge is creating instrumentation that can detect low, diagnostic levels of these disease biomarkers. Now, scientists report in ACS' *Analytical Chemistry* a highly sensitive "sniff-cam" that fits the bill.

Before the advent of modern technology, ancient medical practitioners used breath and body odor to diagnose disease. But healthy people also

emit smelly volatile organic compounds (VOCs), and the levels of these substances can vary depending on other factors, such as sex and body mass, so analysis can be complicated. Over the years, researchers have developed several different types of instruments to detect VOCs, such as ethanol (EtOH), a metabolite of the microbiome in humans that can provide an indication of glucose levels. But current systems to detect VOCs typically require large, expensive equipment and trained professionals. Previously, Kohji Mitsubayashi and colleagues developed a "bio-sniffer" that measured VOCs, such as acetone, a product of lipid metabolism. More recently, they reported the first generation sniff-cam, which could visualize EtOH emissions from the skin of someone who had consumed alcohol. However, the researchers wanted to refine the device so it could detect diagnostic levels of biomarkers.

The researchers constructed a new version of the sniff-cam, which now consists of an ultraviolet ring light, filters and a camera. An enzyme mesh, already used in the previous device, reacts EtOH with oxidized nicotinamide adenine dinucleotide (NAD), producing the fluorescent reduced form of NAD, which the camera records. A new imaging analysis method improved the sensitivity of the system so that low amounts of EtOH could be measured. The updated sniff-cam was then tested on a group of male subjects who had not consumed food or drink, and the device detected miniscule levels of EtOH in their breath. These results show that the sniff-cam can visualize a broader range of VOC levels than previous devices, and its versatility may aid in the further study of the relationship between scent and disease.

More information: Kenta Iitani et al, Ultrasensitive Sniff-Cam for Biofluorometric-Imaging of Breath Ethanol Caused by Metabolism of Intestinal Flora, *Analytical Chemistry* (2019). DOI: 10.1021/acs.analchem.8b05840

Provided by American Chemical Society