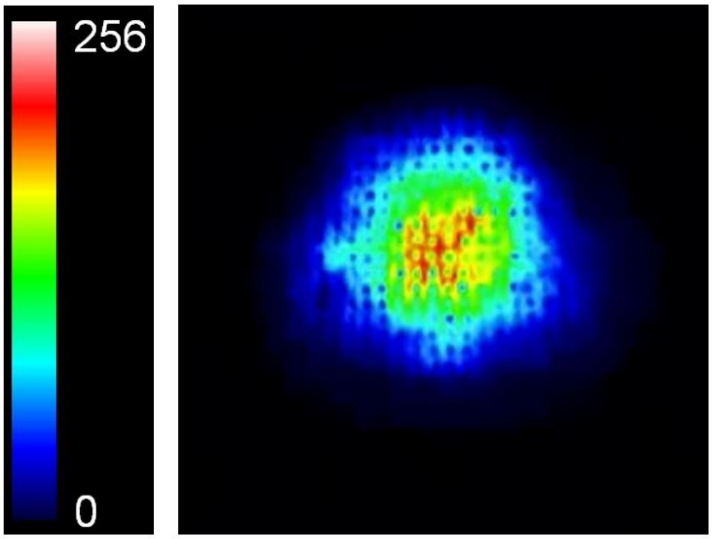
Gas-phase chemical imaging system by biofluorometry for human VOCs measurement

Many gas-phase biosensors have been developed for human volatiles (acetone, methyl mercaptan, trimethylamine, ethanol, isopropanol, etc.) and for residential harmful VOCs (formaldehyde, toluene, nicotine) causing some diseases. A novel gas imaging system by biofluorometry with enzyme immobilized mesh has been investigated to demonstrate a spatiotemporal gas-imaging for human volatiles (i.e. ethanol and acetaldehyde after drinking). A biofluorometric technique was applied to improve the performance (sensitivity, calibration range, gas-selectivity, etc.) of the gas-imaging system. The biofluorometric sniff-cam for ethanol was fabricated with ADH (alcohol dehydrogenase) immobilized mesh and an NADH fluorescent-visualization unit (UV-LED sheet array & highly sensitive camera), thus showing the two-dimensional real-time imaging of ethanol vapor distribution (0.5-200 ppm). The system showed rapid and accurate responses and a visible measurement of ethanol in the gas phase. The intensity of fluorescence was linearly related to the concentration of ethanol vapor. The high sensitivity fluorescent imaging of ethanol vapor allows to successfully visualize gaseous ethanol from the human body (exhaled air and skin gas) after drinking. The sniff-cam system would be useful for conventional detecting and imaging the volatile biomarkers.



Real time maging of ethnaol vapor