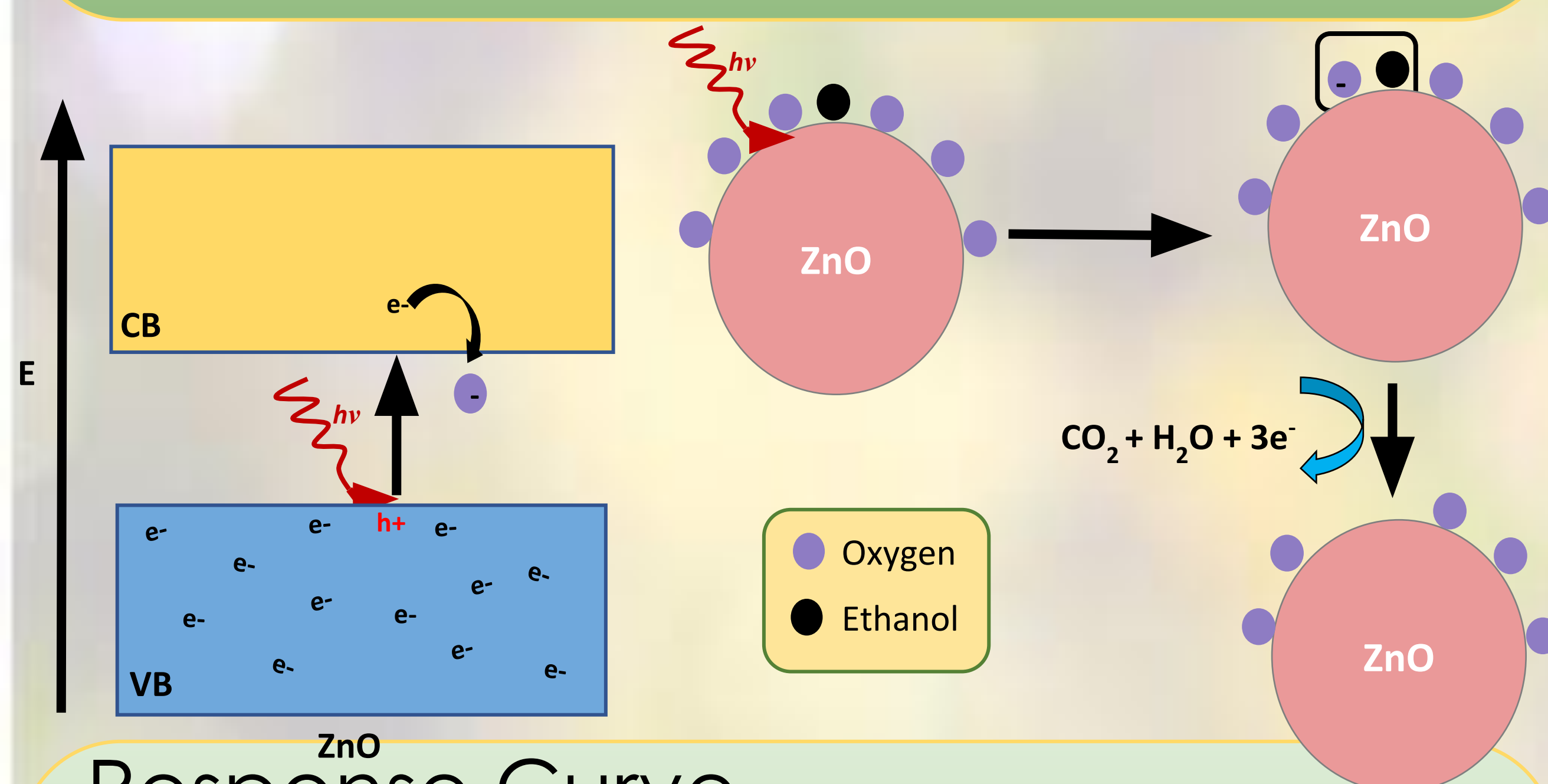


Problem and Context

Volatile organic compounds (VOCs) are commonly emitted by wineries in the form of ethanol (EtOH), which can cause many health and environmental problems. To regulate emission levels, the government requires implementation of EtOH scrubbers in the wine fermentation process. Our device aims to assist in this effort by monitoring the efficiency of these scrubbers and providing real time, quantifiable emission values in parts per million through the use of zinc oxide (ZnO) sensors.

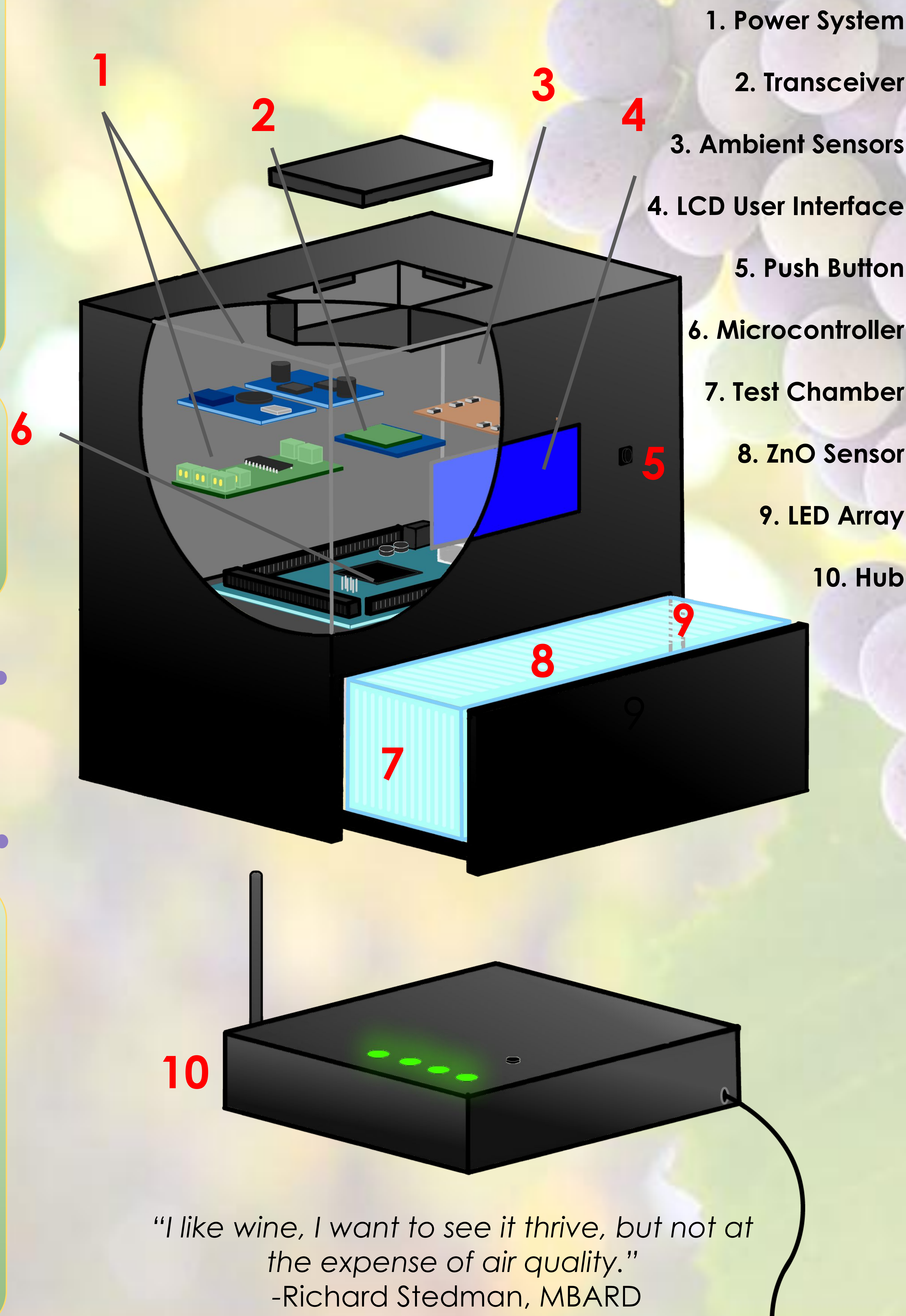
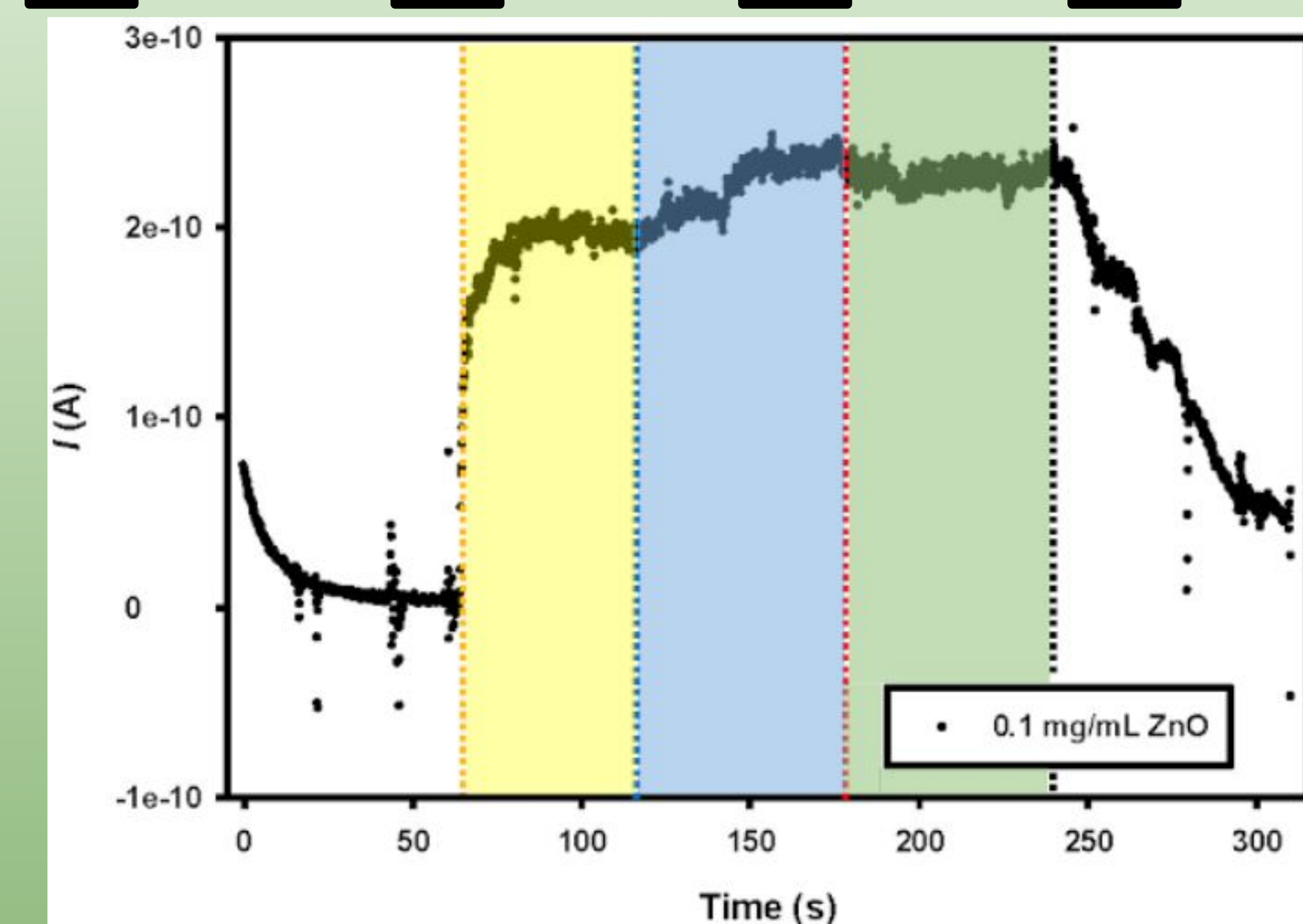
Zinc Oxide (ZnO) Sensor

When stimulated by UV light, EtOH reacts with ZnO to increase conductivity across the channel of the interdigitated electrode (IDE). This response can then be quantified through resistance measurements across the IDE.



Response Curve

Light off Light on EtOH in EtOH out



Features

- Mechanical housing keeps electrical components organized and protects them from harsh external conditions in a 6.26 x 8.75 x 8.75in hard shell box.
- Environmental sensors track the consistency of ambient conditions inside the chamber, helping to preserve the quality of the data
- User interface with quick button functionality and bright LCD allows for instantaneous sampling.
- Up to 100 meters of wireless data transmission to local hub and SD card creates an accessible system for data storage.
- A compact, battery-powered system with DC-DC converters ensures device portability. Up to 336 hours, or 2 weeks of battery life.

Future Direction

- Implementation at wineries for season-long sampling will give feedback and credibility to scrubber regulation
- Further sensor development will allow for detection of other VOCs, adding to the versatility of the device
- Future applications in commercial composting facilities, cannabis processing farms, and other manufacturing sites will pioneer environmental policy enforcement

"I like wine, I want to see it thrive, but not at the expense of air quality."
-Richard Stedman, MBARD