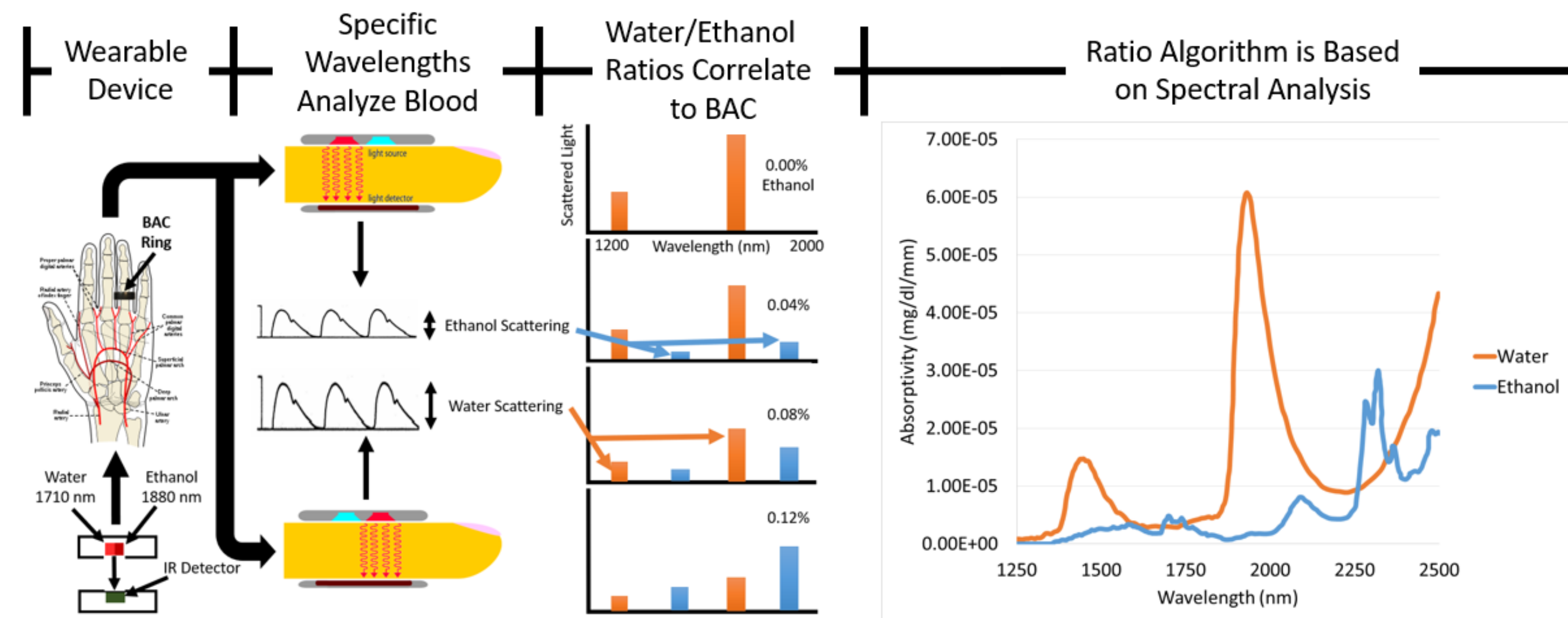


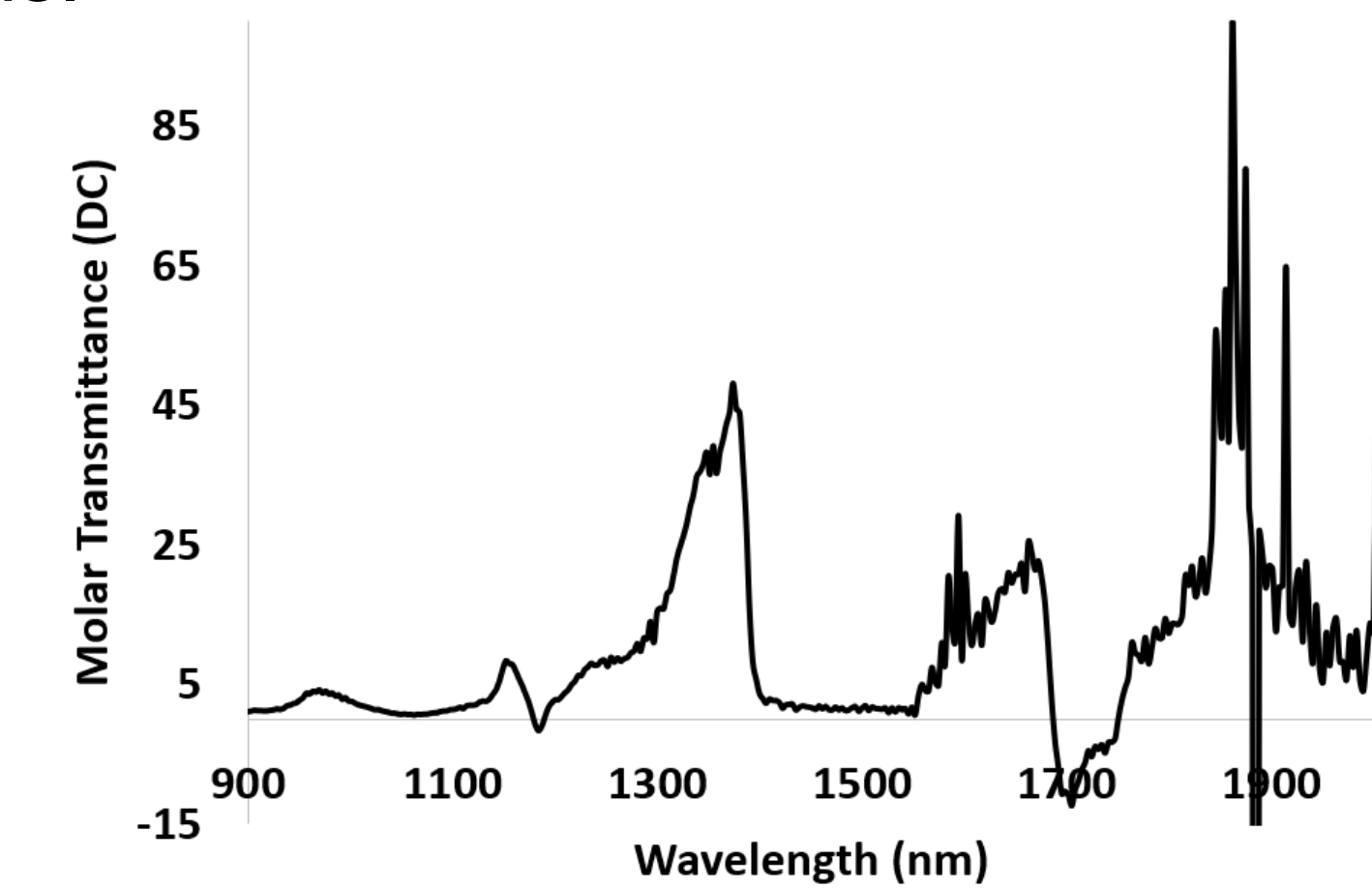
## Background and approach

- Alcohol abuse is unfortunately common among veterans, and there is often a stigma surrounding treatment
- A discreet, non-invasive solution for monitoring progress and recovery is needed
- Solution: a transmittance based non-invasive near-infrared (NIR) light measurement system capable of determining real-time blood alcohol concentration (BAC) and reporting it to the user in a recognizable way (e.g. smart watch, bracelet, ring, etc.)



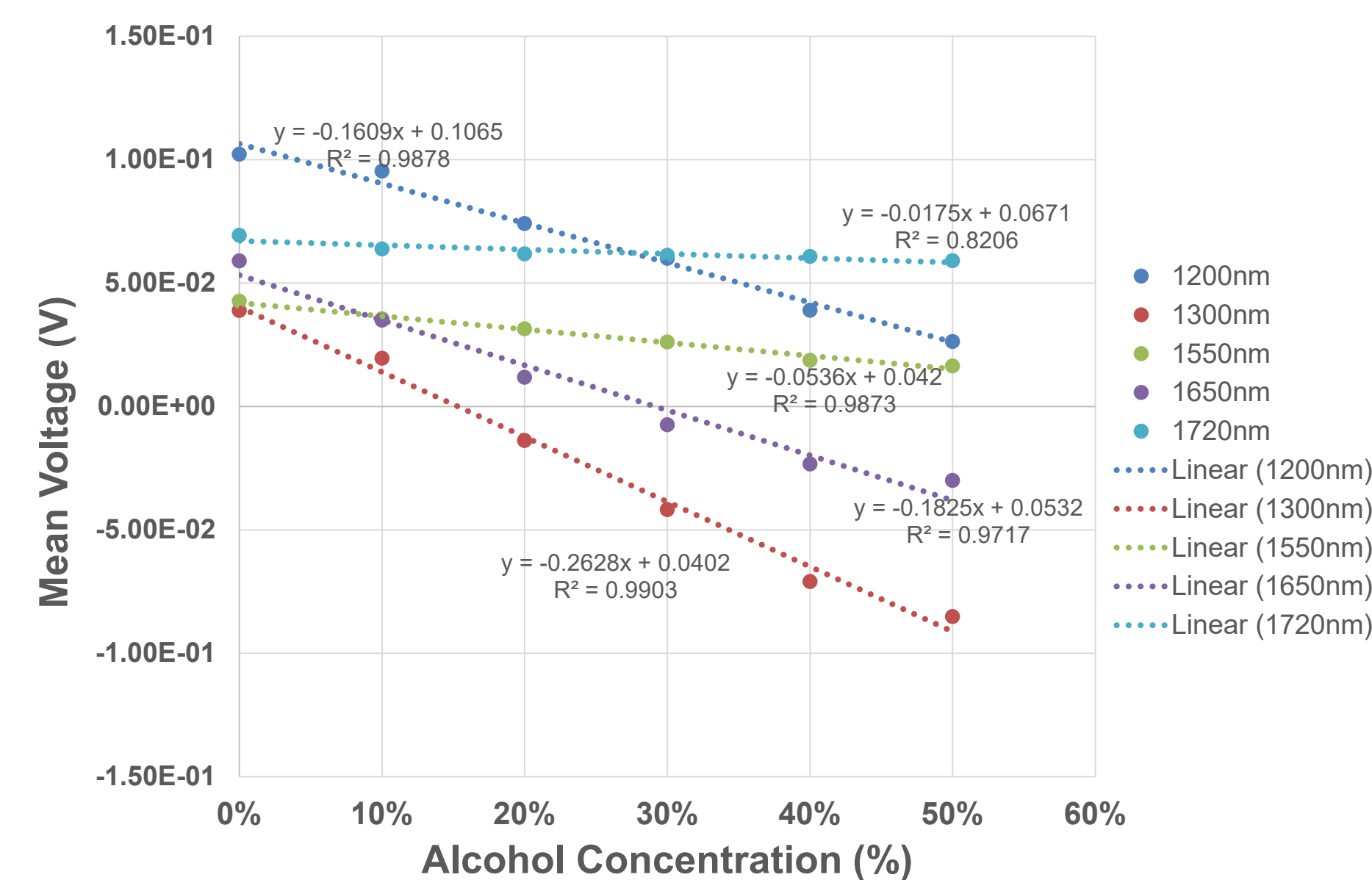
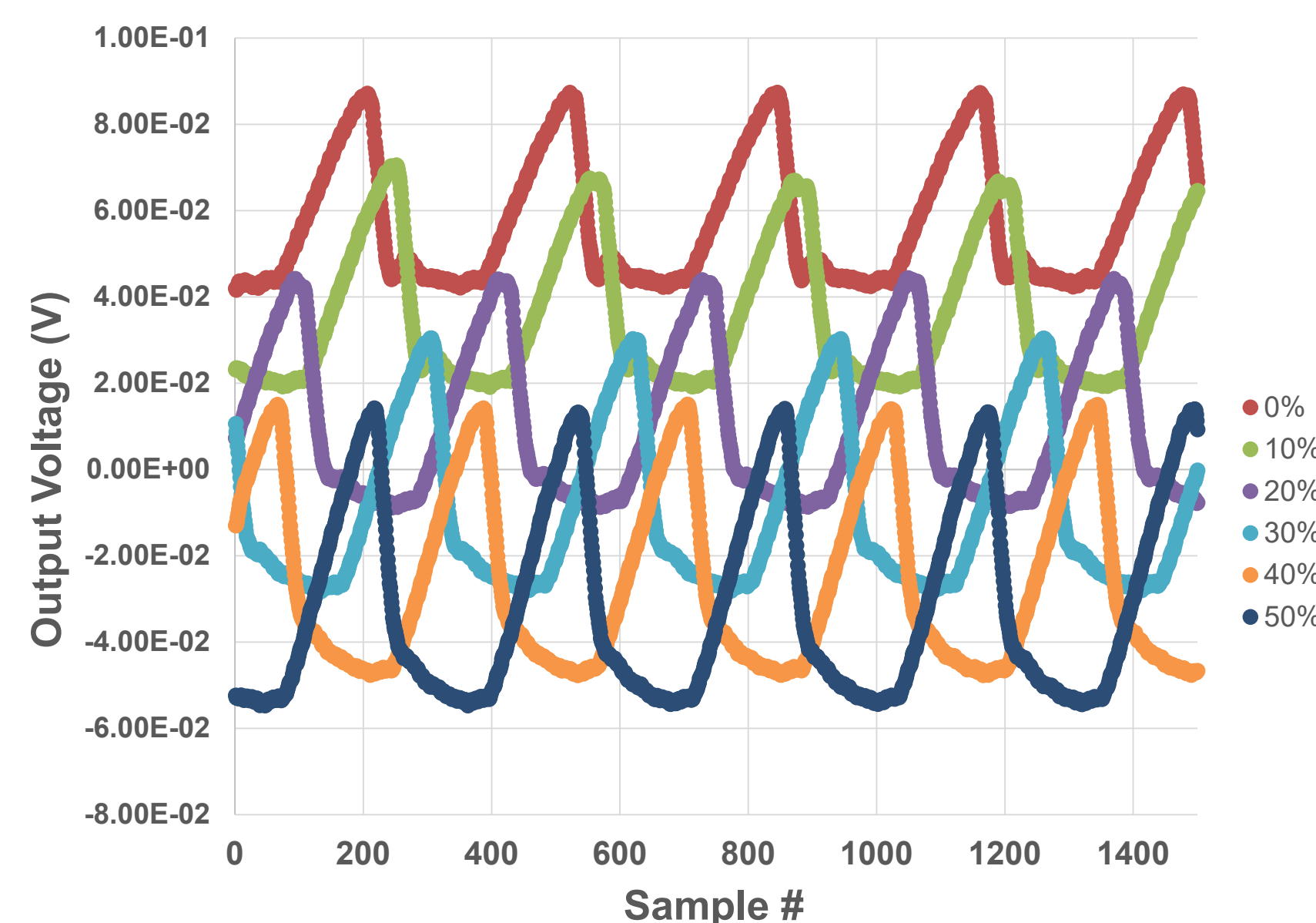
## Spectrometry of ethanol solutions

A spectrometer was used to measure transmittance and absorbance of controlled ethanol concentrations. **Below:** Molar transmittance of ethanol vs water for 0-40% ethanol solutions. From this, appropriate wavelengths were selected to maximize the ratio of response between multiple wavelengths.



## Results – Pulsatile phantom model

We fabricated silicone phantoms with an artificial artery to simulate pulsatile flow at 50-120 BPM. **Below left:** Pulsatile flow detected by BAC prototype at 1650nm. **Below right:** Relation of alcohol content to BAC prototype output for selected wavelengths.



## Conclusions and future directions

- Artificial pulsatile flow detection signal is proportional to concentration of alcohol.
- Alcohol reporting wearables are not only feasible but on track to change the lives of service men and women worldwide.
- Next phase (right):** Prototype wearable sensor.



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