

Title: Manufacturable Flexible Hybrid Oral Biochemistry Sensing System

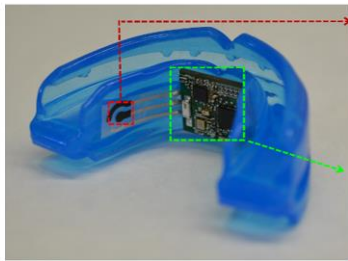
Team: PARC (lead), University of California, San Diego

Abstract: The aim of this project is to develop a flexible hybrid biosensor platform to enable continuous remote monitoring of bioanalyte concentrations in saliva. The project builds on previous collaborative work between PARC and UCSD in such a sensor system, and is focused on advancing the technological and manufacturing readiness levels (TRL and MRL) of the technology by addressing several key gaps in fabrication technology. The project will aim to deliver a Technology Platform Demonstrator (TPD) comprising a flexible hybrid sensor label that can be affixed to a mouth guard for continuous access to salivary analytes. The TPD will have the following characteristics:

- Small, flexible form factor (2 cm by 4 cm) appropriate for a mouth guard (previous demonstrations are on rigid PCBs or too large to mount on a mouth guard)
- Encapsulation of the electronics to protect them from saliva for 24 hours (previous demonstrations were not encapsulated)
- Wireless charging of a secondary battery (previous demonstrations used a primary battery)
- Biostability in saliva for 8 hours (not previously demonstrated)
- Manufacturing-appropriate processing steps and semi-automated fabrication (fabrication of previous demonstrators combined manual and automated processes)
- Removable, disposable printed electrode strip (not previously demonstrated)
- Bluetooth communication via over at least 3 meters, compatible with a smart watch or phone

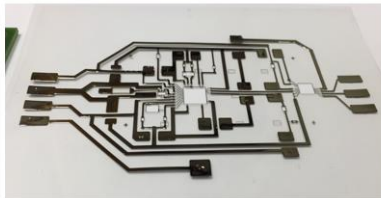
Technology Advancement

Prior work:
TRL 4-5/MRL 4



Amperometric biosensor

Miniaturized electronics on PCB



Biosensor circuit with flex-hybrid fabrication



This project:
TRL 6/MRL 6



Semi-automatically fabricated flexible hybrid circuit on mouth guard with wireless charging and readout