

# BIODEGRADABLE PEPTIDE FUNCTIONALIZATION LAYERS FOR CONTACTLESS ELECTRICAL SENSING OF VOLATILE ORGANIC COMPOUNDS

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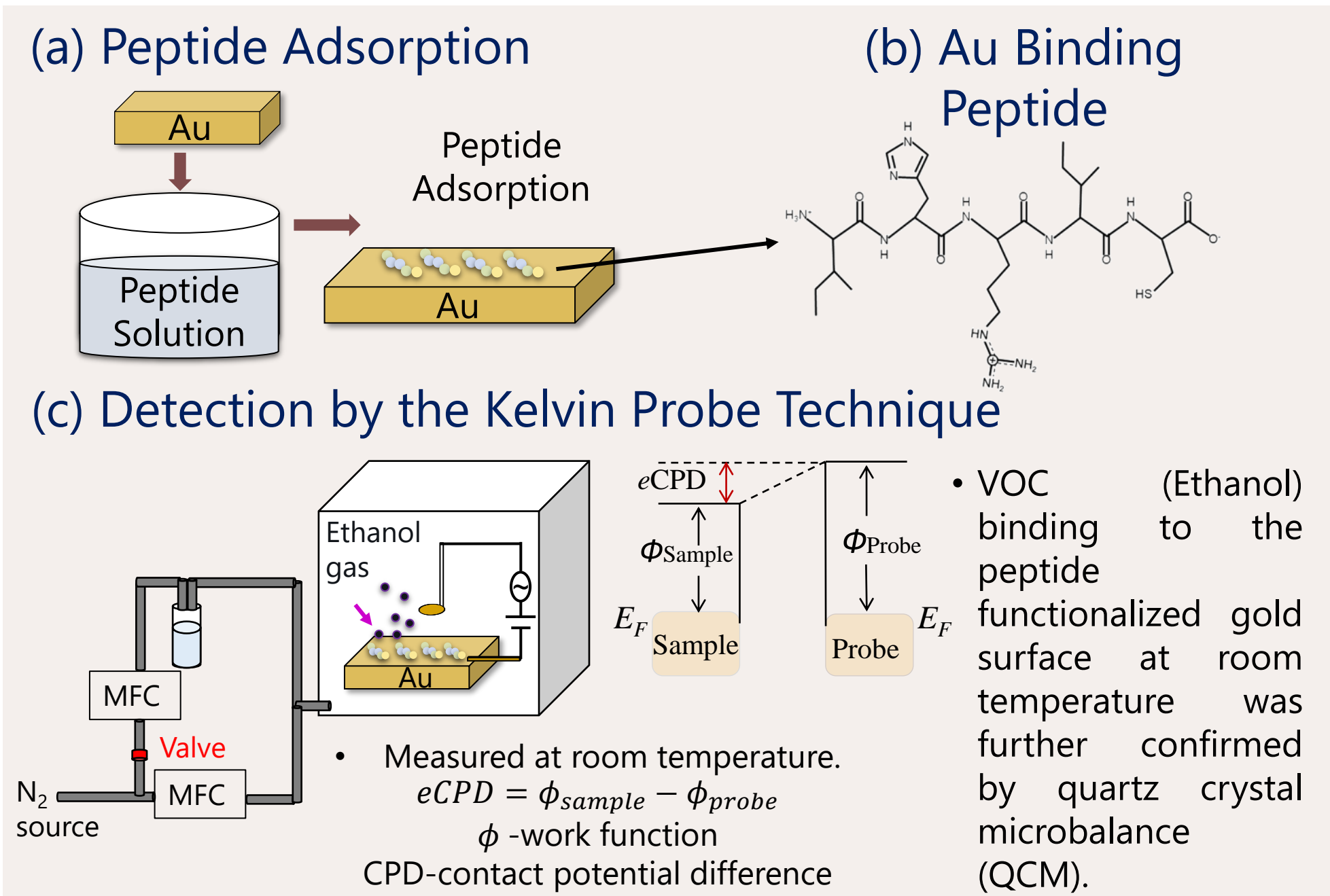
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## Introduction

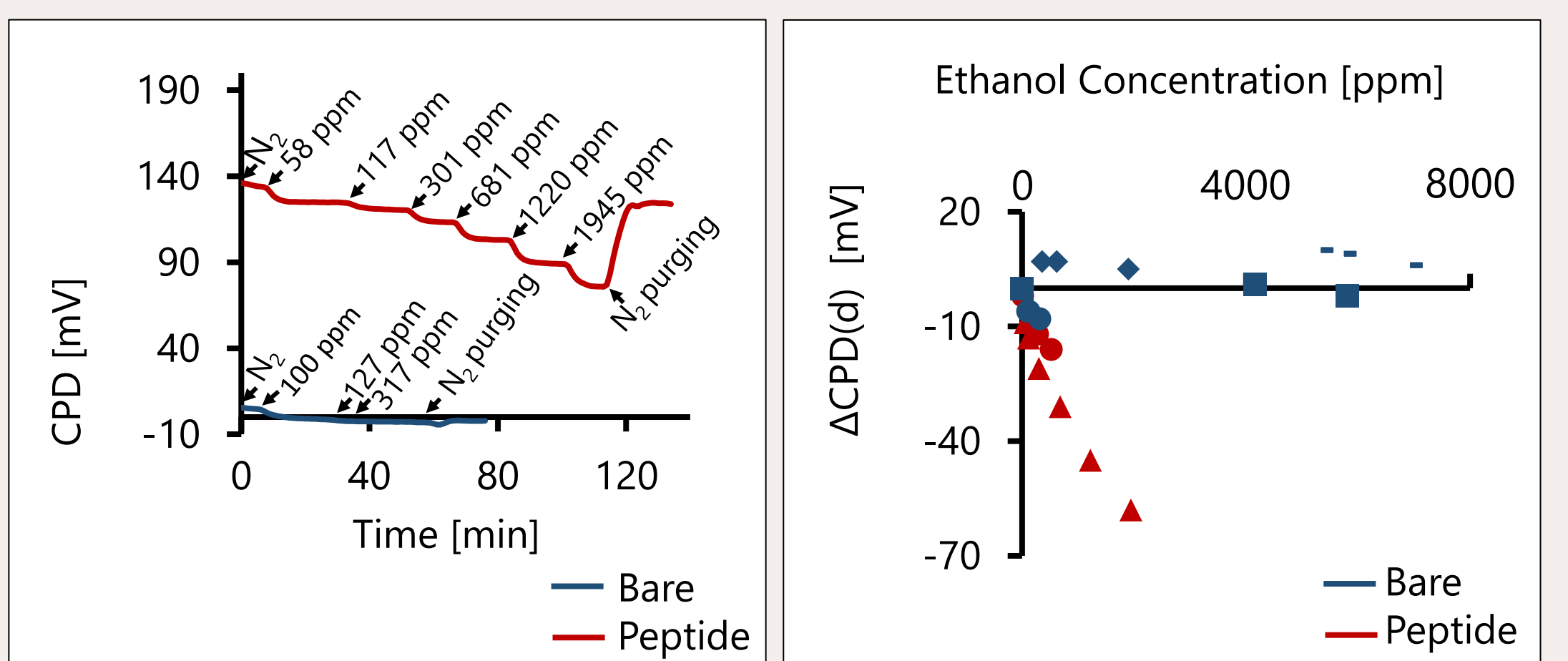
Analysis of volatile organic compounds (VOCs) composition in breath samples can signify health conditions related to metabolic or infectious diseases. Functionalization of a sensor's surface with peptide is an attractive approach for improved detection. In such configuration, the peptides' versatility and modularity is used for designing sensitive and selective receptors for the VOCs. **Here, I demonstrate that VOC binding to the peptide can modulate the surface work function and consequently transduce the binding interactions into an electrical signal that can be read in a contactless manner, using the Kelvin probe technique.**

## 1) Methodology

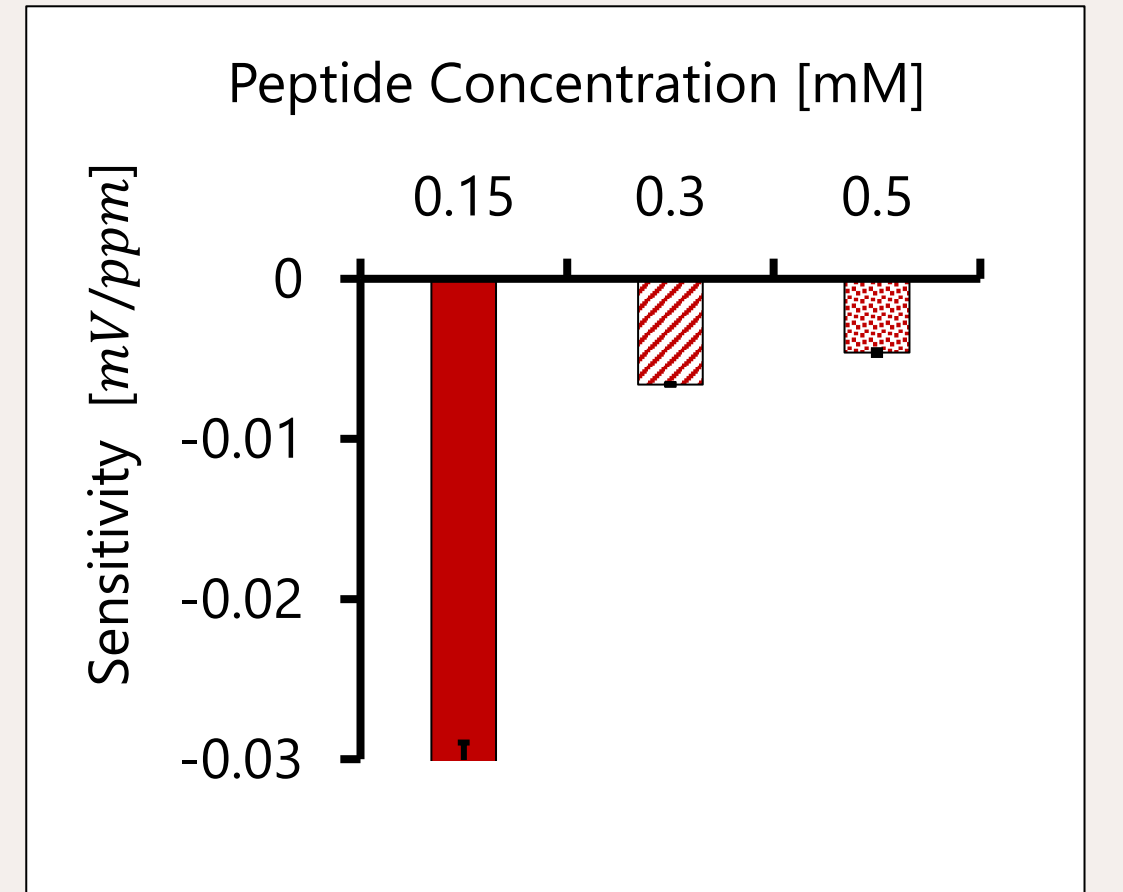


## 2) Ethanol Electronic Detection

CPD measurements of bare and functionalized Au substrate exposed to ethanol at room temperature

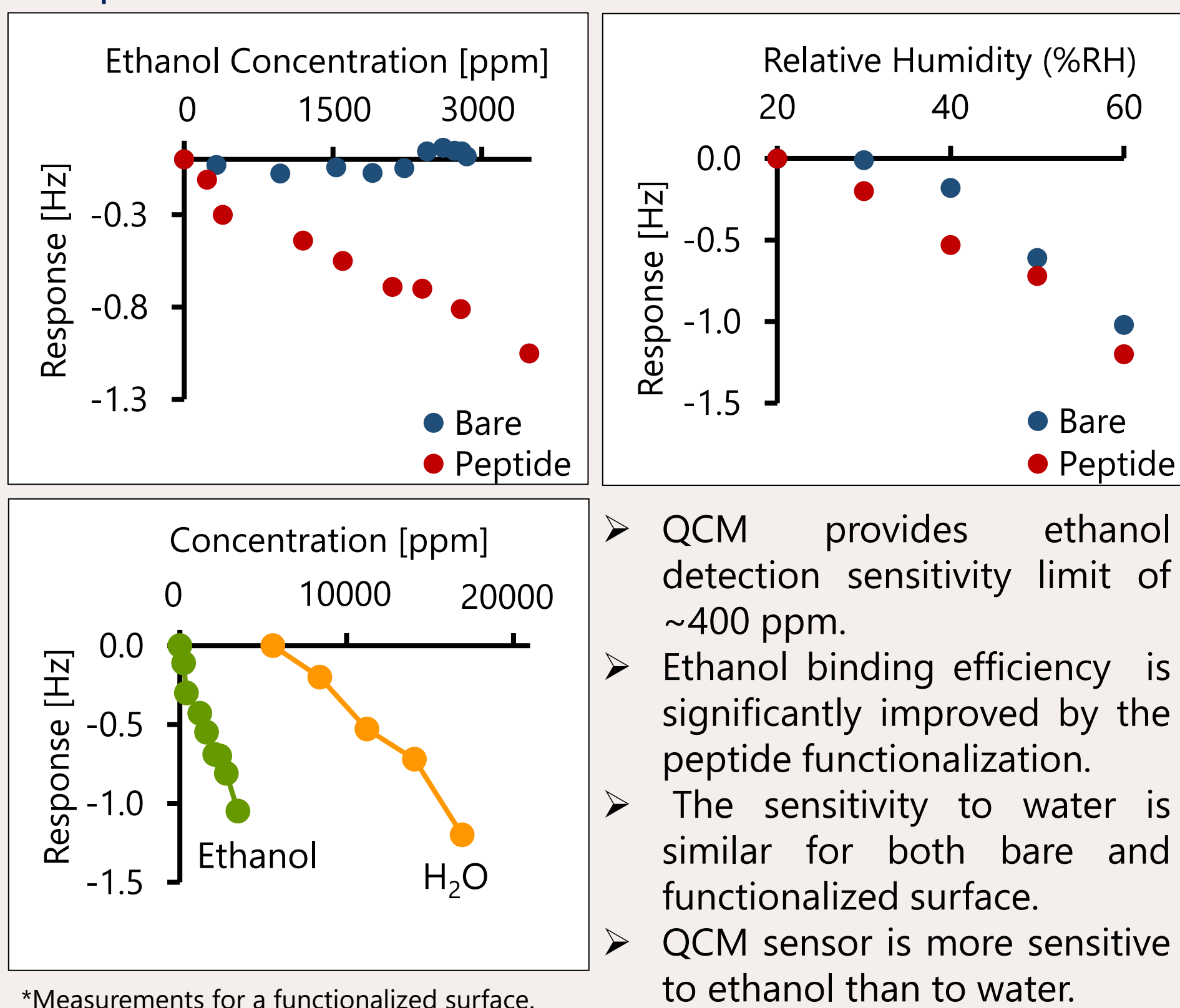


- The sensitivity to ethanol is significantly improved by the peptide functionalization.
- Detection limit of ~ 100 ppm ethanol is indicated.
- Assembly conditions affect ethanol sensitivity, probably due to differences in peptide conformation and the resulting molecular dipole.



## 3) Adsorption Characterization

Ethanol and water detection by QCM at room temperature



\*Measurements for a functionalized surface.

## 4) Conclusions

- Peptide receptor can be used not only for VOC binding but also for transduction of the chemical signal into an electrical signal.
- The binding of ethanol induce changes to the surface dipole that are linearly proportional to its concentration in the atmosphere at a large dynamic range.
- **The Kelvin probe approach shows higher sensitivity to VOC (ethanol) detection than the commonly use QCM.**