

Gii™ Technology

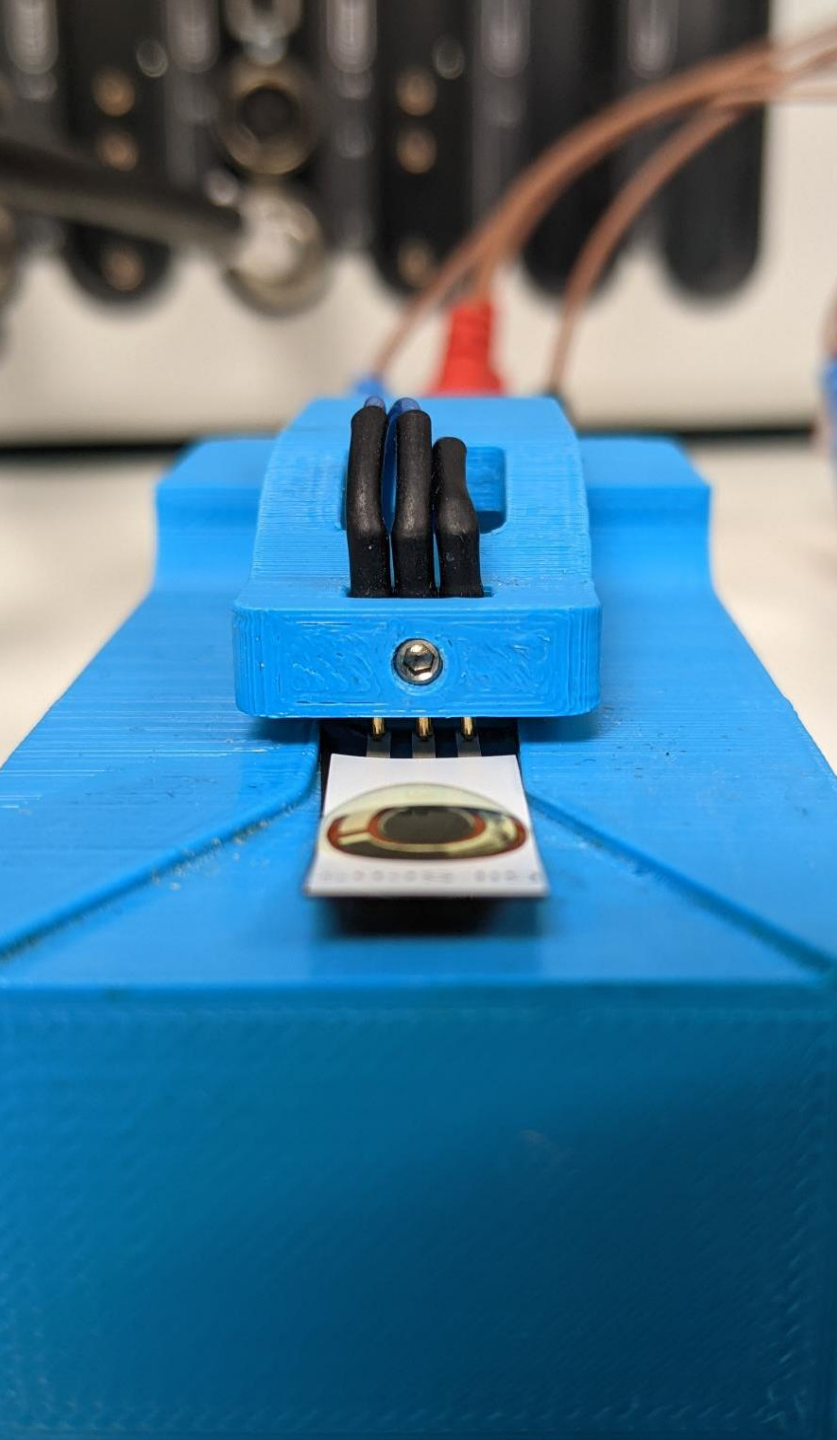
# Developing Electrochemical Biosensors Using Novel Carbon Nanomaterial Electrodes

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40<sup>th</sup> Chemnitz Seminar, Germany



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# Outline

- Gii: The Core Material
- Gii-Sens Configurations
- (More) About Gii
- Gii-Assays: Diabetic Ketoacidosis Monitoring
- Summary
- Services

# The Core Material - **Gii**

98% pure carbon – no binders or additives

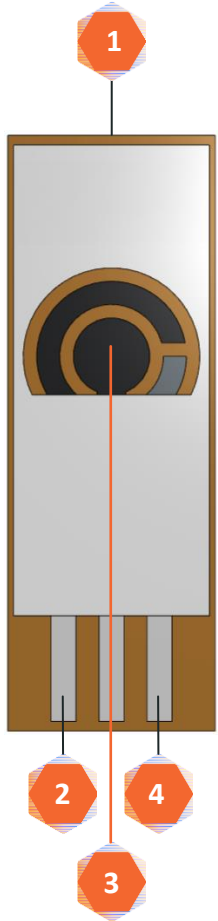
3 – 5 times higher electroactive area than geometric surface area

Manufactured anywhere, anytime with scalable production

Application Areas include Sensing, Energy & Catalysis, Heating, Cooling etc.,



# Gii-Sens Configurations



## Gii-Sens Research

### 1. Sensor Base

Polyimide substrate

### 2. Counter Electrode

3D Carbon nanomaterial, Gii

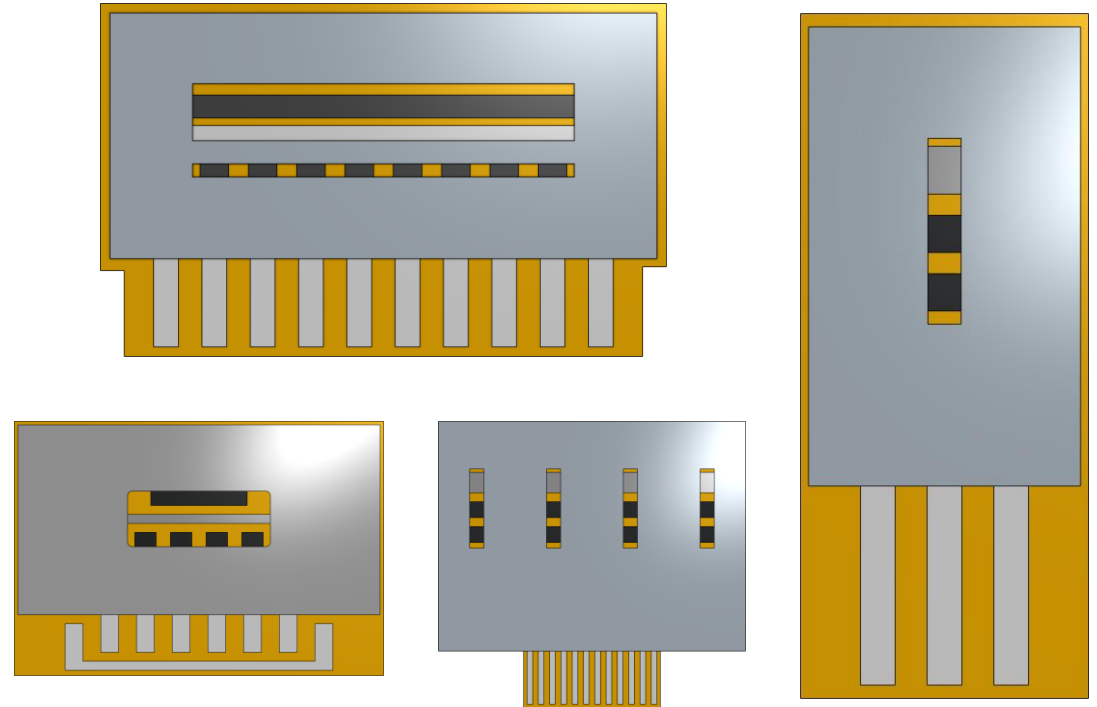
### 3. Working Electrode

3D Carbon nanomaterial, Gii

### 4. Reference Electrode

Screen Printed Ag/AgCl

## Gii-Sens Custom





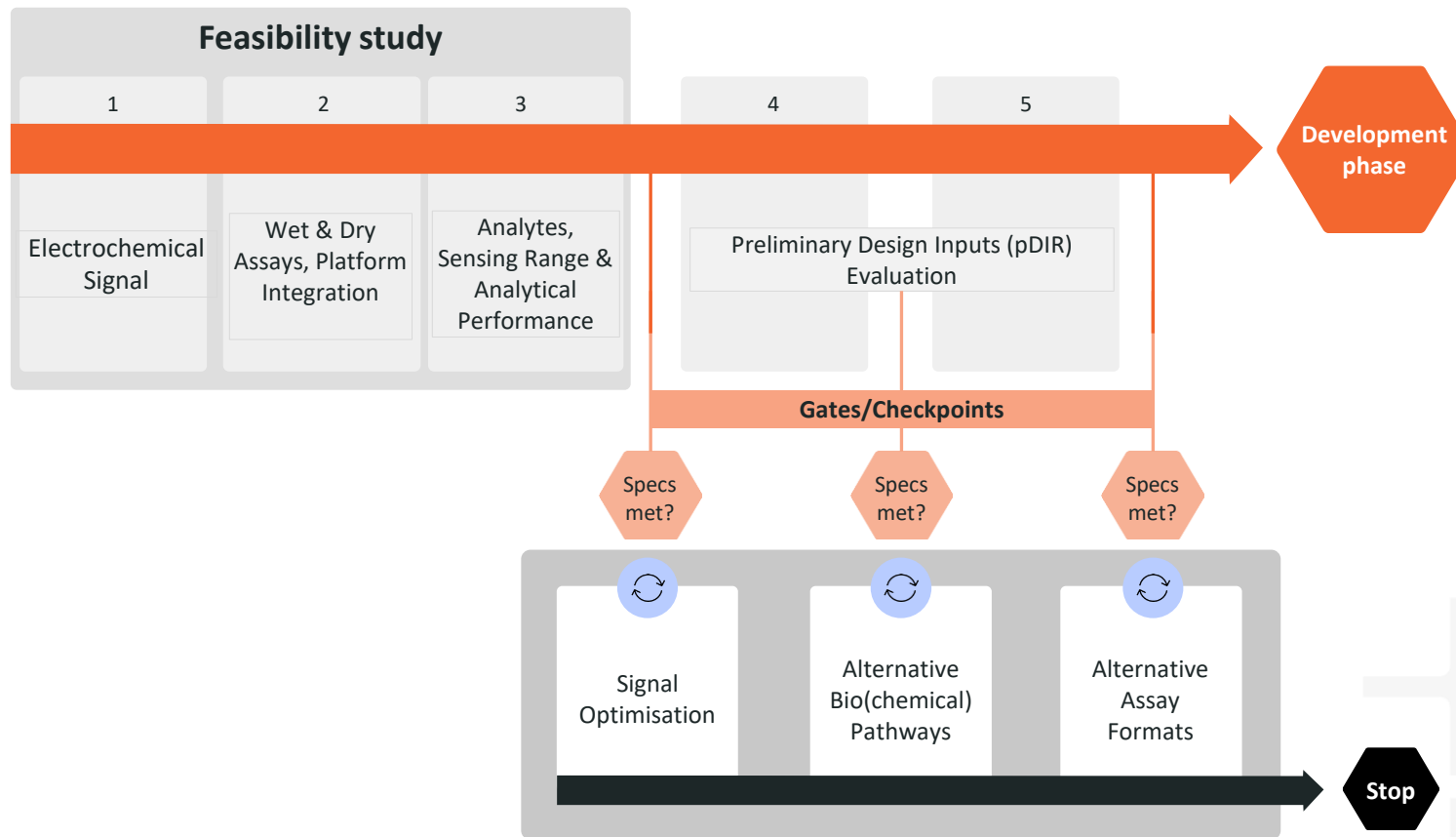
# About Gii

## Specialties

- Gii-Sens – Gii-based electrodes
- Gii-Assay – Precision assay development on Gii technology
- Gii-Platform – Proven sensing platform, ready for commercialisation
- Gii-Technology – Pure, porous 3D carbon nanomaterial



# Gii-Assays: Diabetic Ketoacidosis Monitoring



# Gii-Assays: Diabetic Ketoacidosis Monitoring

Biochemical Pathways of Ketogenesis



## Ketogenesis

Metabolic process that produces ketone bodies, which are alternative energy source for the body

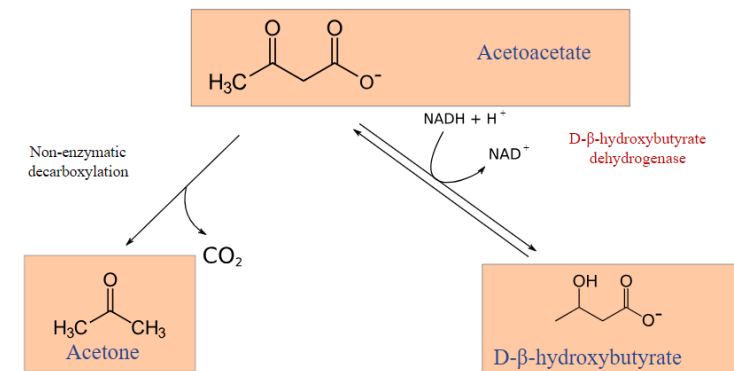


## Ketone Bodies

Acetone  
Acetoacetate  
D-β-Hydroxybutyrate



## Choice of Pathway



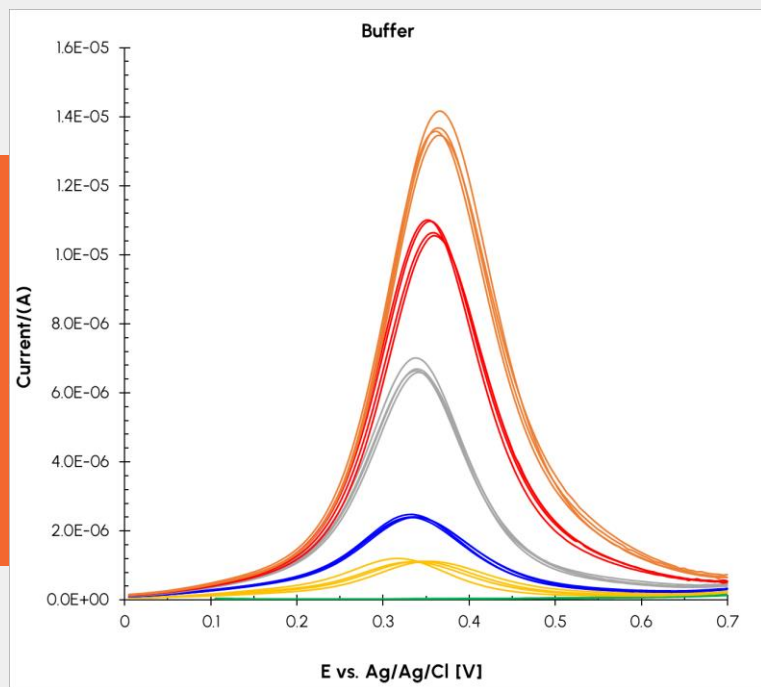
- Electrochemical signal
- Substrates & co-factors optimisation

# Gii-Assays: Diabetic Ketoacidosis Monitoring

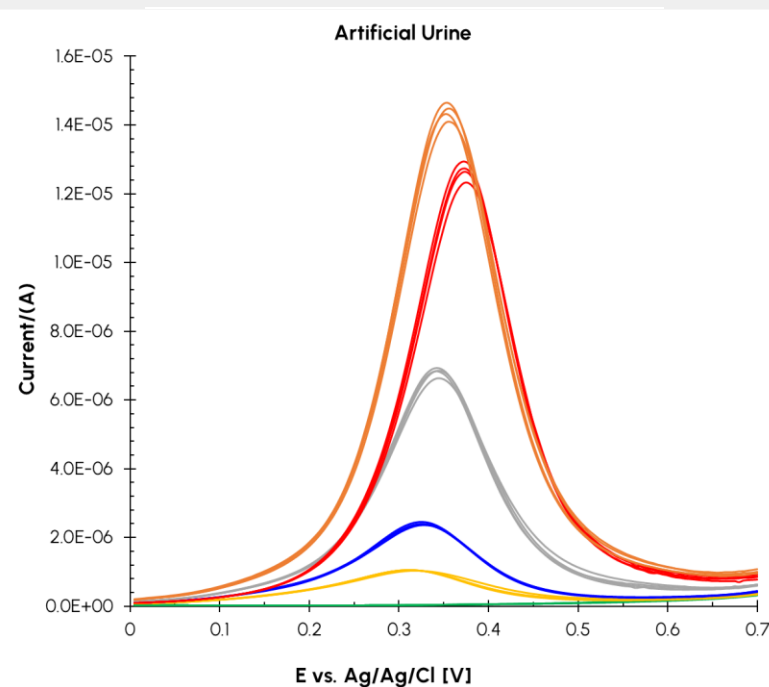
Choice of electrochemical signal

## Overview

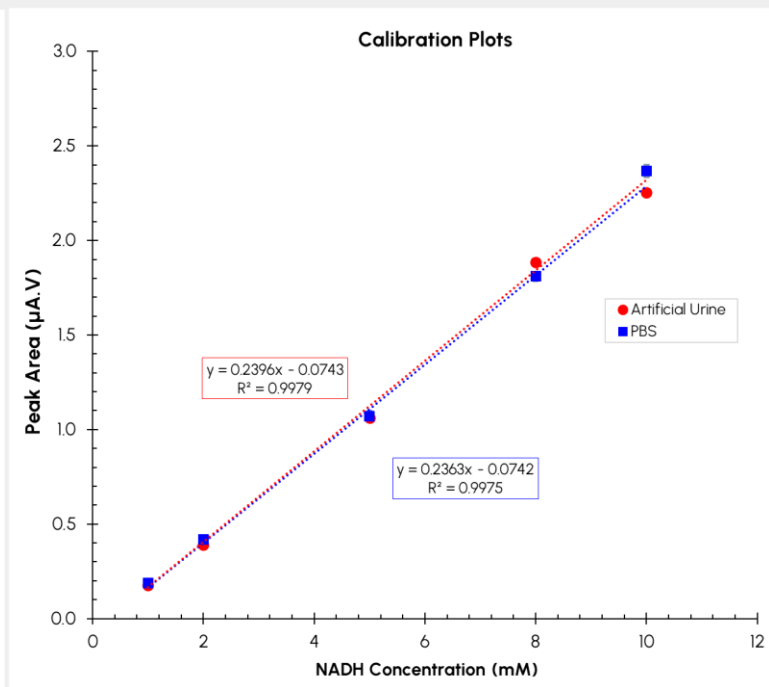
Each concentration done in 5 reps; Error bar represents standard deviation of 5 reps



Detection of NADH in buffer



Detection of NADH in artificial urine



Calibration plots of NADH in buffer & artificial urine

## KEY

- 0 mM NADH
- 1mM NADH
- 2mM NADH
- 5mM NADH
- 8mM NADH
- 10mM NADH

Gii-Sens has excellent non-fouling properties in complex biological matrices such as whole blood plasma/serum, saliva, whole milk, urine etc.,

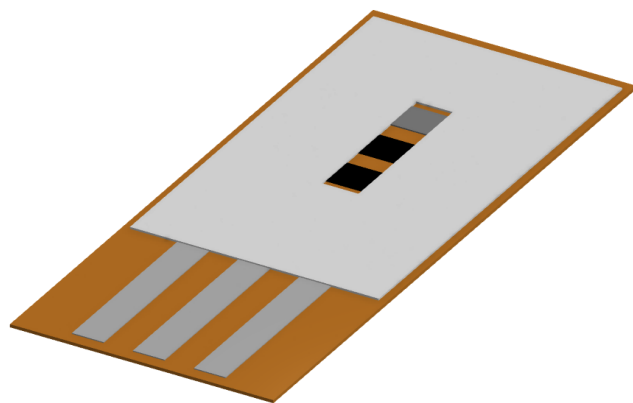


# Gii-Assays: Diabetic Ketoacidosis Monitoring

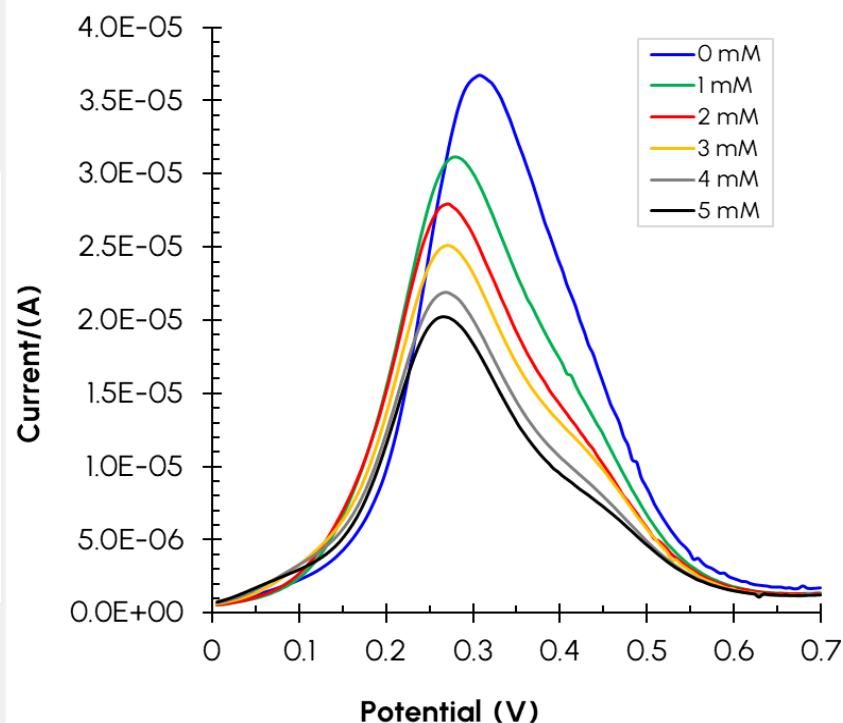
Applying electrochemical signal

## Wet Ketone Assay

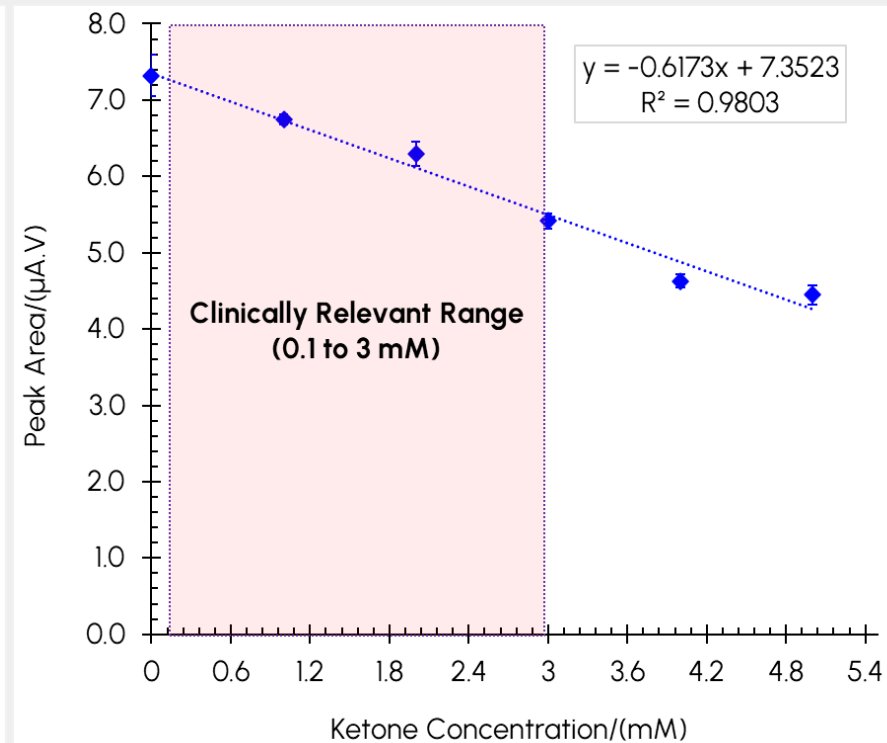
Each concentration done in 5 reps; Error bar represents standard deviation of 5 reps. 5 min assay time



Sensor Design



SWV for ketone in artificial Urine



Calibration plot for ketone in artificial urine

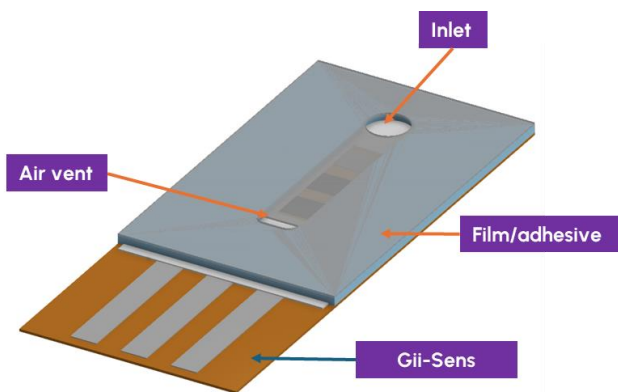
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# Gii-Assays: Diabetic Ketoacidosis Monitoring

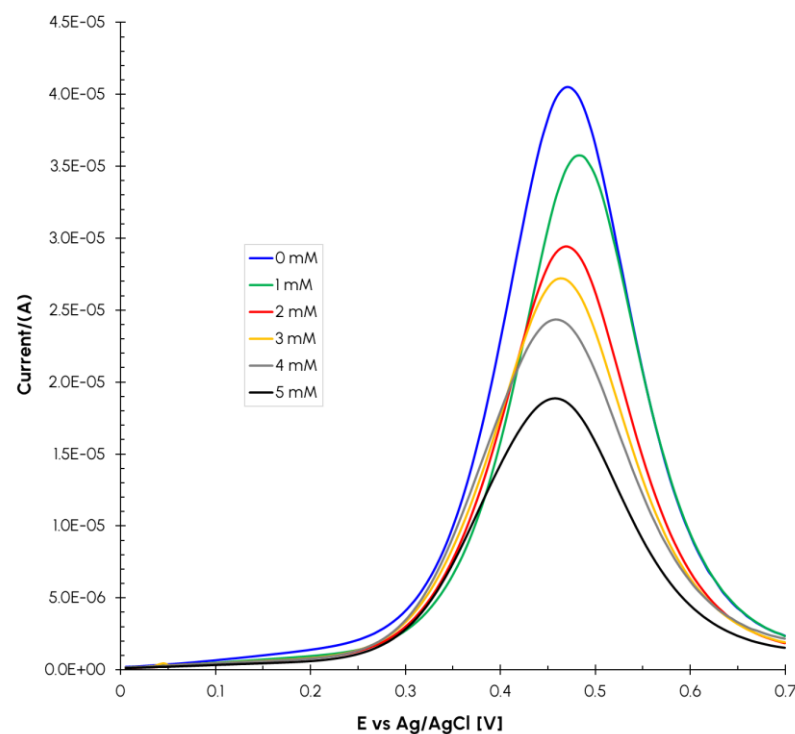
Applying electrochemical signal

## Dry Ketone Assay

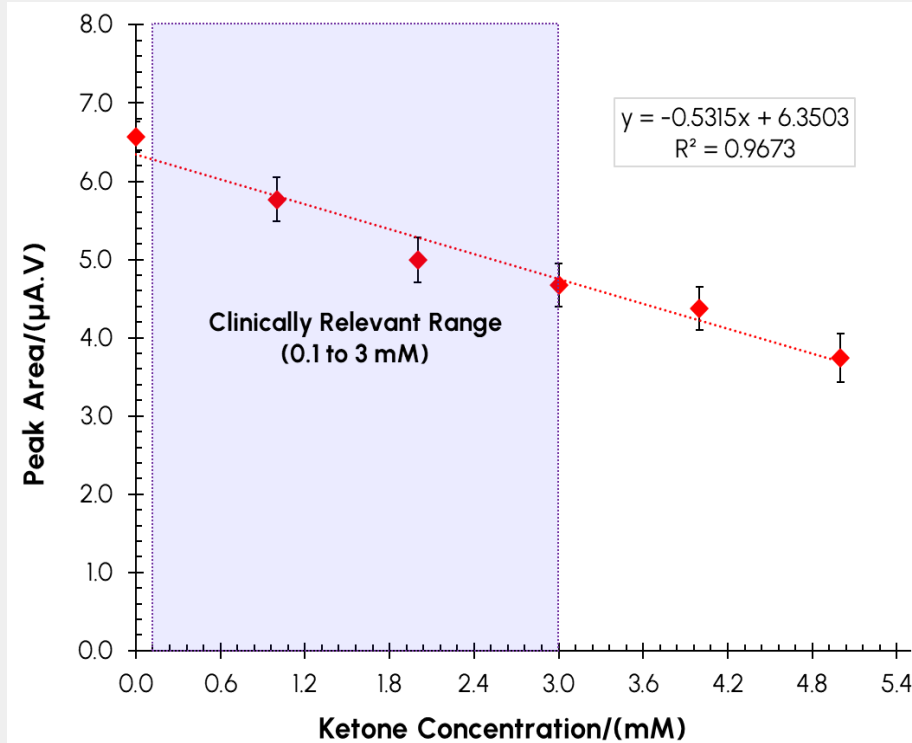
Each concentration done in 5 reps; Error bar represents standard deviation of 5 reps. 5 min assay time



Sensor Design



SWV for ketone in artificial Urine



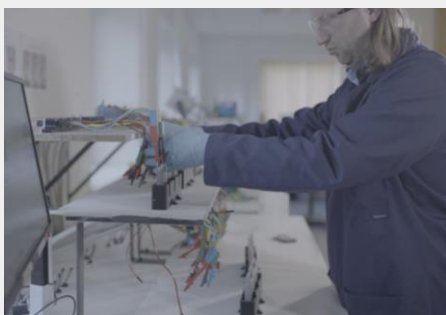
Calibration plot for ketone in artificial urine

# Summary

01

## Choice of biochemical pathway

Acetoacetate



02

## Choice of signal for assay

Electrochemistry



03

## Assay development

Optimize wet assay and translate into a fully dried assay while maintaining analytical performance characteristics

04

## Platform integration

Current status



# iGii - Services

iGii is dedicated to advancing the electrochemical biosensor market. We are focused on supporting the adoption of Gii technology for biosensors, aiming to enhance performance and sustainability across the industry.

Gii-Sens supply

Custom Gii electrode and material design

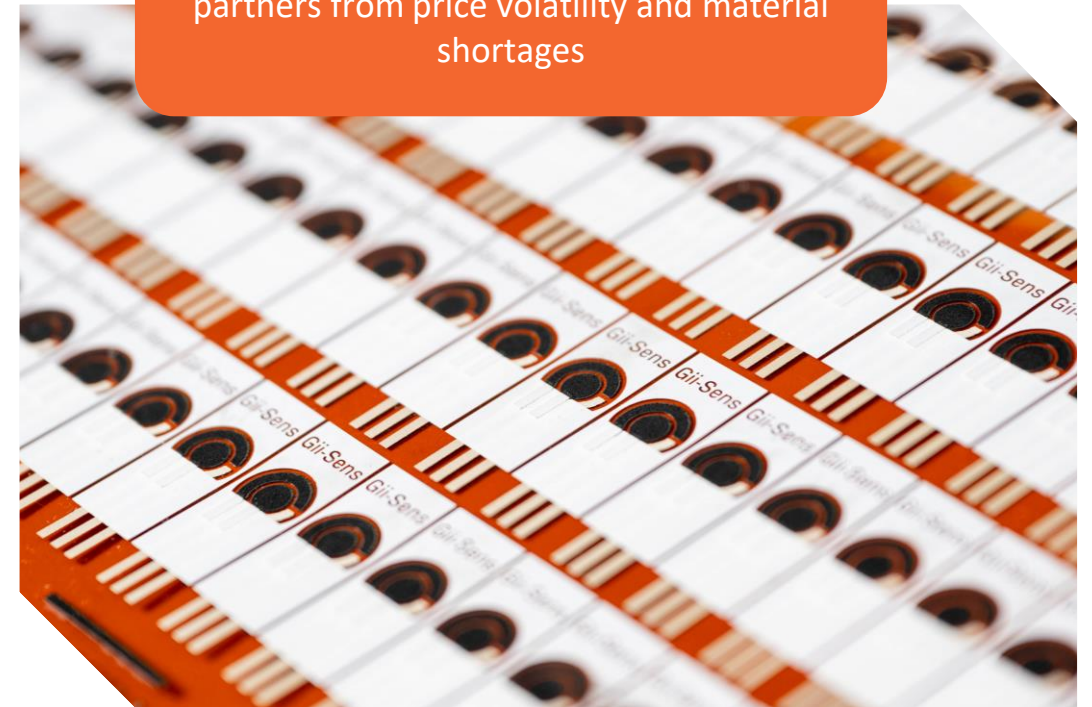
Custom Gii assay development including receptor screening

Rapid prototyping - microfluidics, cassette and cartridge

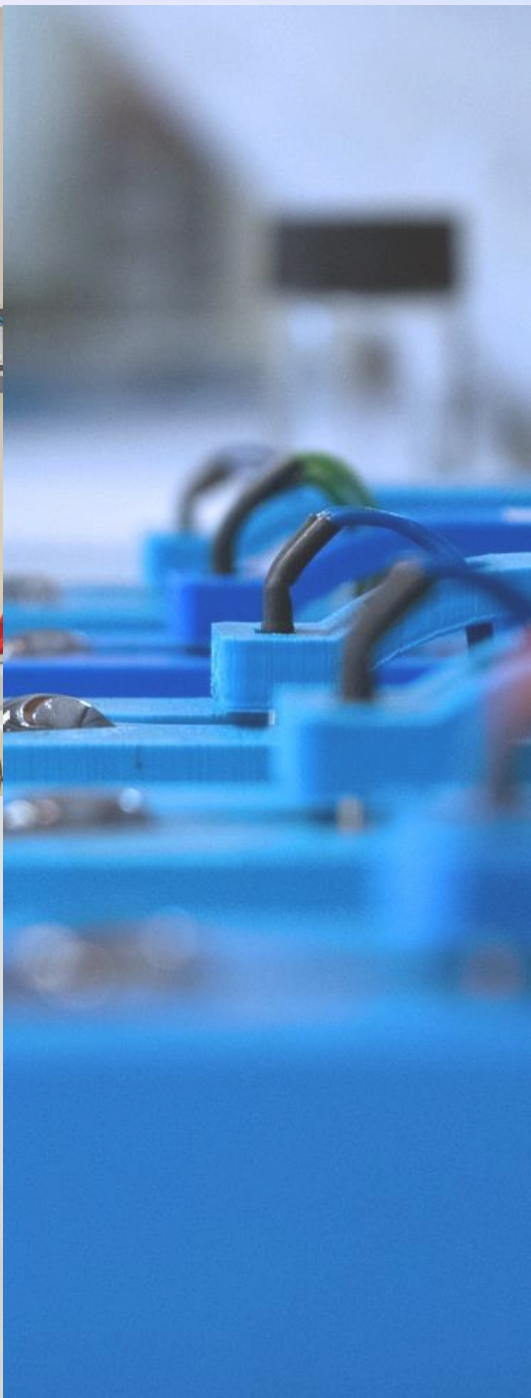
Consultancy – assay, electrode and reader concepts

Large scale manufacturing – roll to sheet and roll to roll (Q1 2025)

Inherent flexibility and reliability shields partners from price volatility and material shortages







# Thank You

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