

Zimmer & Peacock

eSensor Manufacturing and Technology

Cyclic voltammetry told through Chilli Sensing

2017



Zimmer & Peacock

eSensor Manufacturing and Technology

Case Study - measuring the hotness of chillies



Cyclic voltammetry

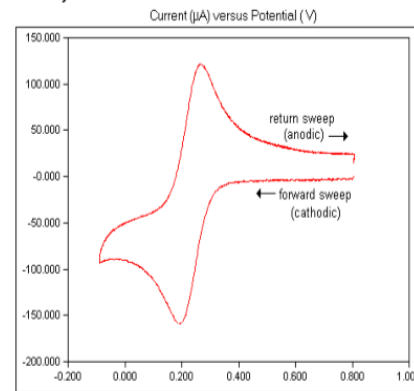
$$i_p = 0.4463nFAC(nFvD/RT)^{1/2}$$

n = Number of electrons

F = Faraday's Constant 96,485 C/mole

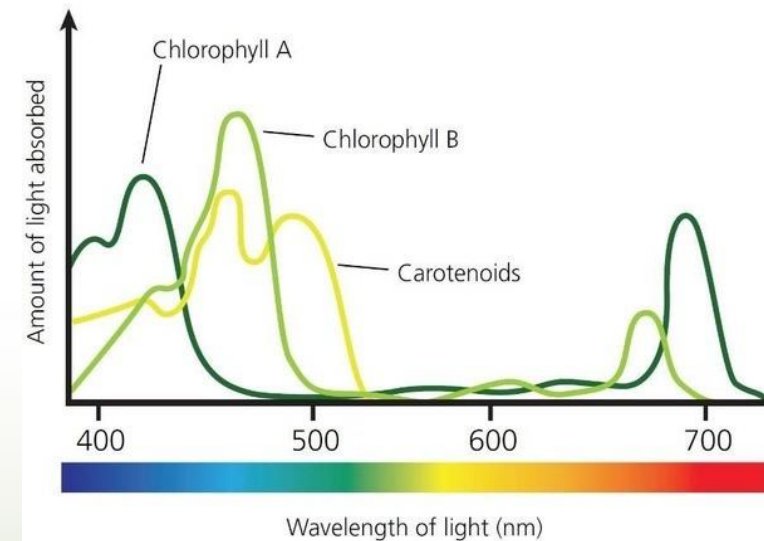
A = Electrode Area cm^2

D = Analyte Diffusion Coefficient $\text{cm}^2 \text{s}^{-1}$



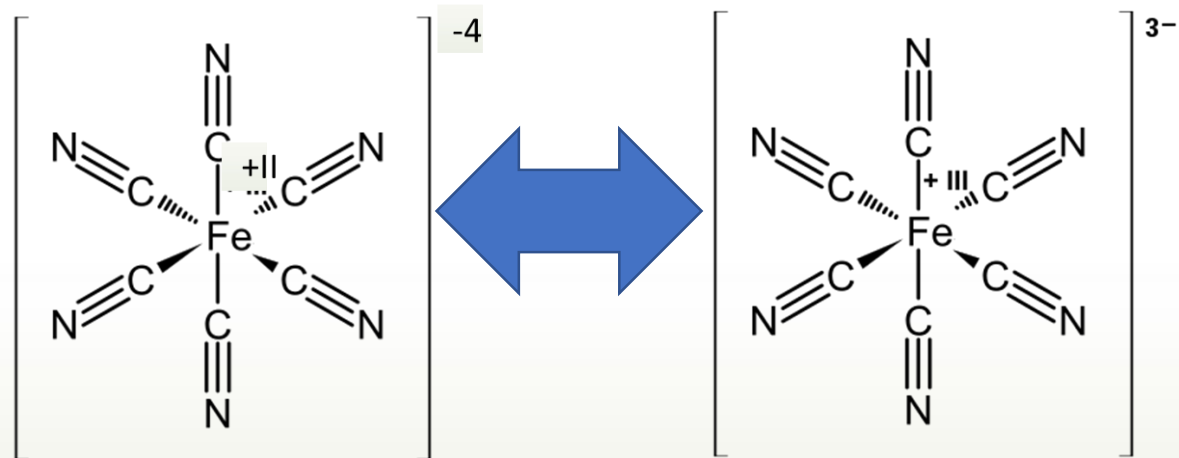
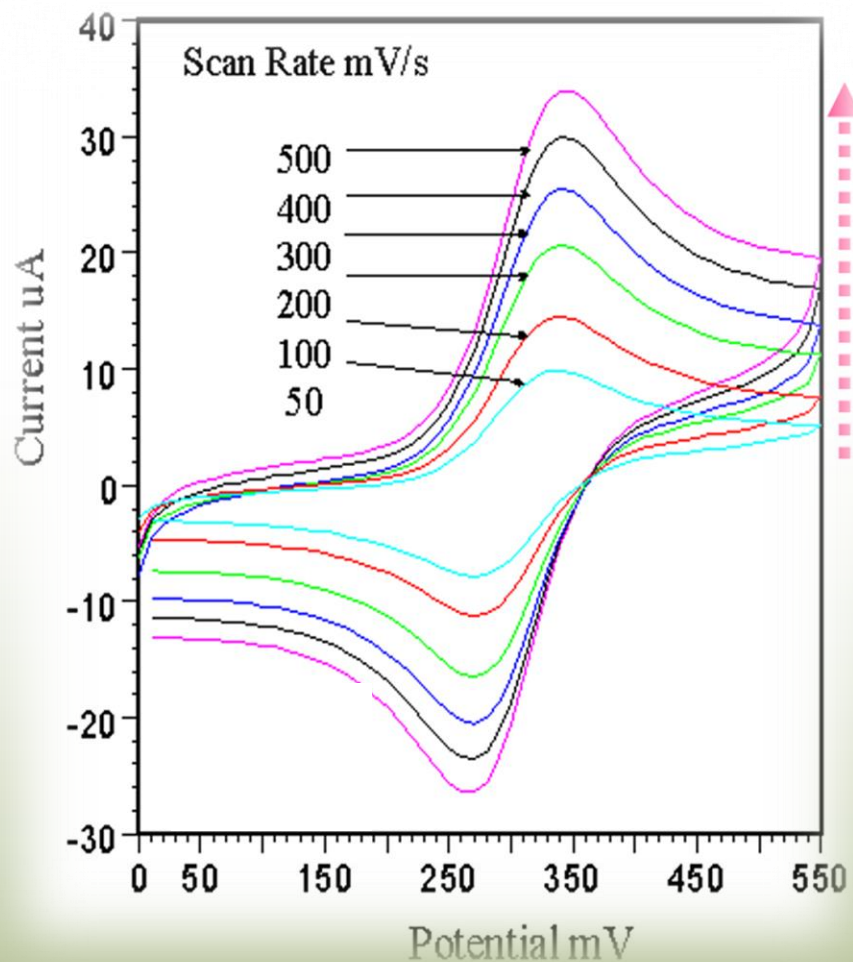
Ratio of i_{pa} to i_{pc} should be close to one, but vary with chemical reactions coupled to electrode process.

Cyclic voltammetry



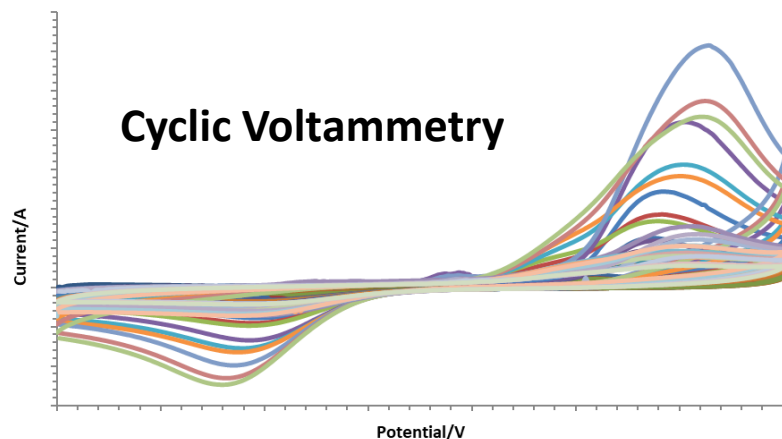
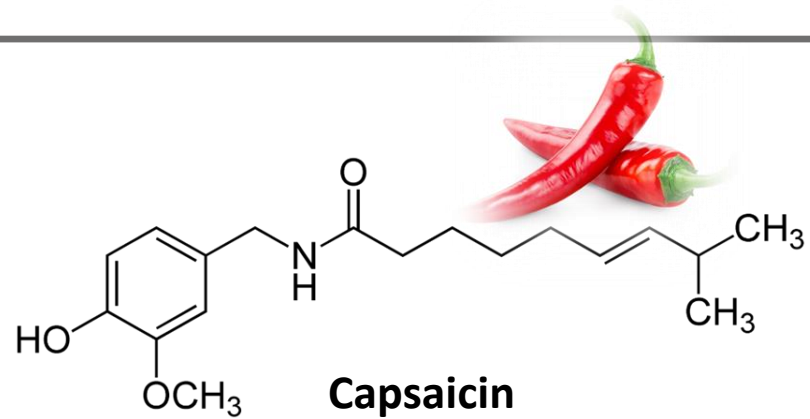
Absorption spectroscopy

A model system



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Background



theguardian



Daily Mail

Media

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World wide media interest



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The competition



Analytical Testing



Panel Testing



Guessing



Point of Need Testing

From glucose to chilli testing



Glucose strip



Chillie strip

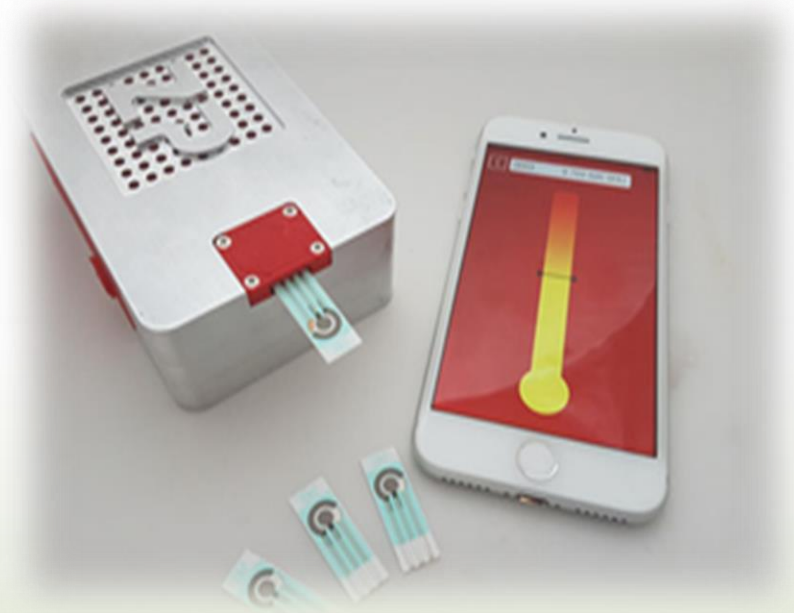
Glucose home monitoring

- Offers immediate knowledge of blood glucose.
- No sample preparation
- Used by non-experts.
- Anywhere testing.
- Offers low cost testing.
- Traditionally 20 % accurate, after 15 years 15 % accurate.



ChilliPot-Scoville Meter

- Offers immediate knowledge of capsaicin levels
- Little sample preparation
- Use by non-experts.
- Anywhere testing.
- Offers low cost testing.



Validation Parameters	
Correlation Coefficient	0.9741
Intercept	-0.0812
Slope	0.0351
LOD	38.5 SHU
LOQ	116.8 SHU
Range	38.5 – 20,000,000 SHU
Relative Standard Deviation	8.8%
Cochran's C Test (Observed value)	0.581
Cochran's C Test (Critical value)	0.653

Today we are talking about Point of Need Testing for the food industry



ZP Chilli Technology Group

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Chilli Science meets Artisananship

Welcome to Zimmer and Peacock's Chilli Sciences Group, where we provide science and technologies around the growing, understanding and characterizing chillies and chilli derived products.

Products

Welcome to the ChilliPot the worlds first and only Scoville Meter.

Services

Welcome to our Chilli Services from Scoville Testing to ASTA HPLC Testing.

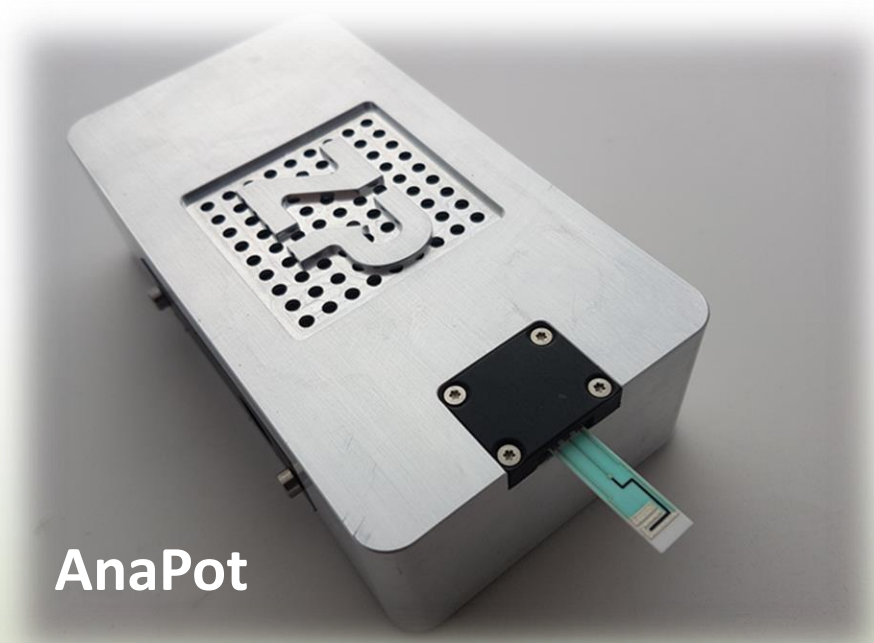
About us

Find out all about the ZP Chilli Technology Group.



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Quiz – spot the difference



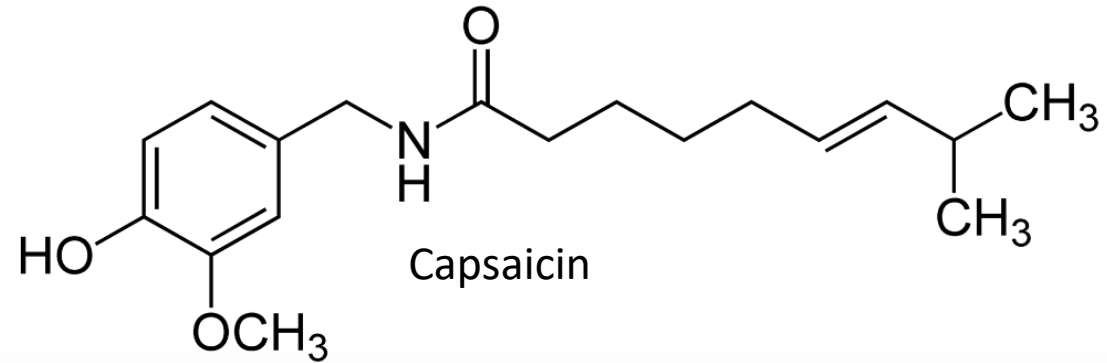
AnaPot



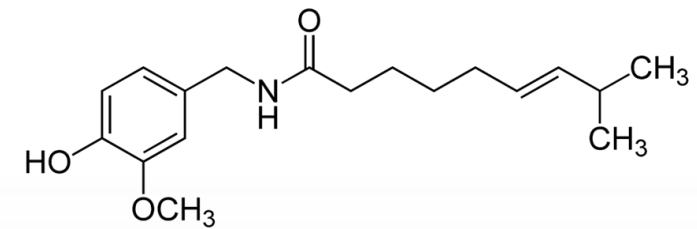
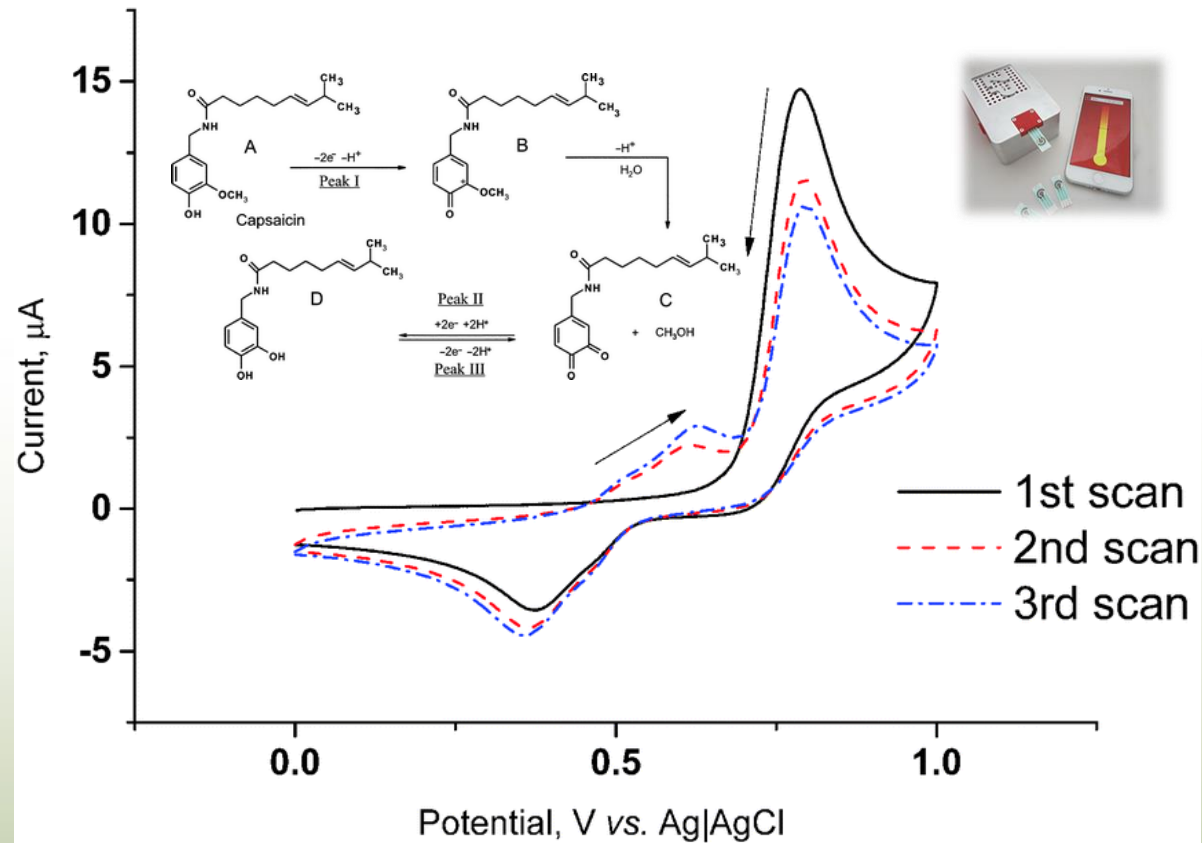
ChilliPot

The Science— Chilli Sensor

- Hotness measurement

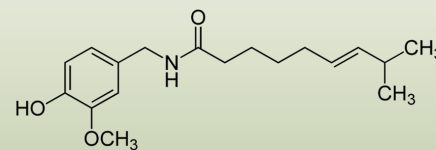
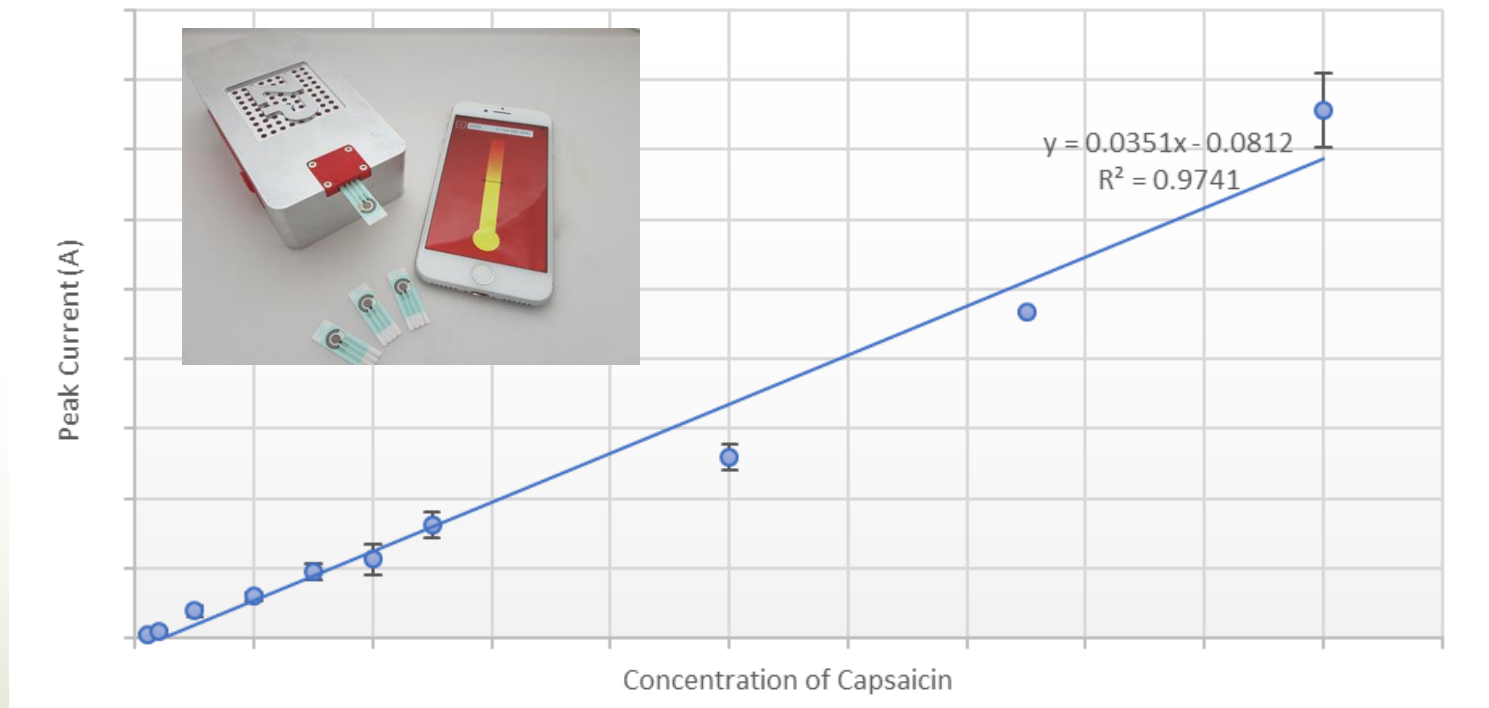


What we do – the science



Signal to user friendly number

Signal



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Our shopping list



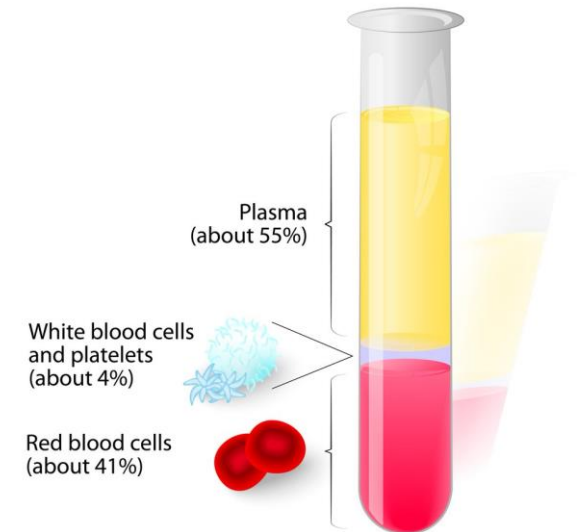
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Matrix effect



- Chilli Sauce
- Chilli Pepper
- Chilli Powder
- Chilli Paste

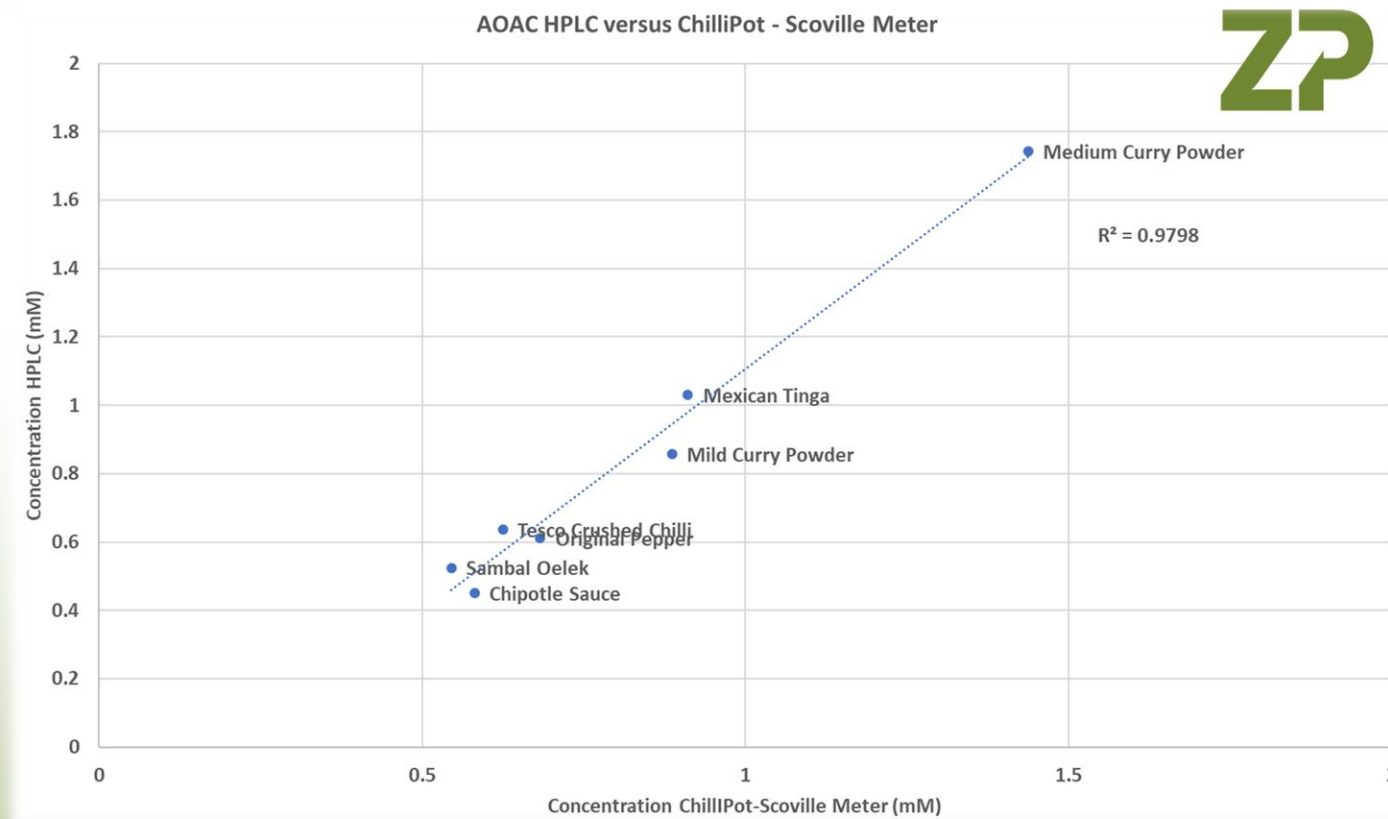
COMPOSITION OF WHOLE BLOOD



Validation of shopping list



**HPLC
method**

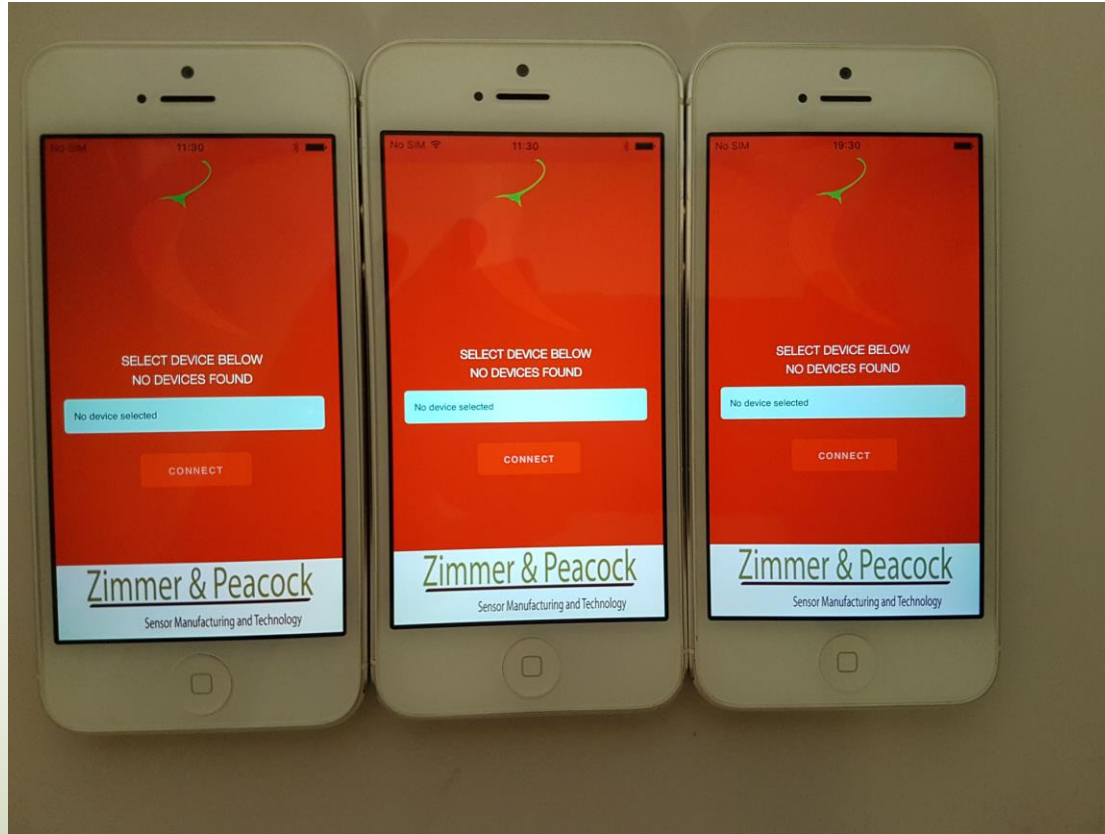


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Electrochemical Method

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i-Phone App



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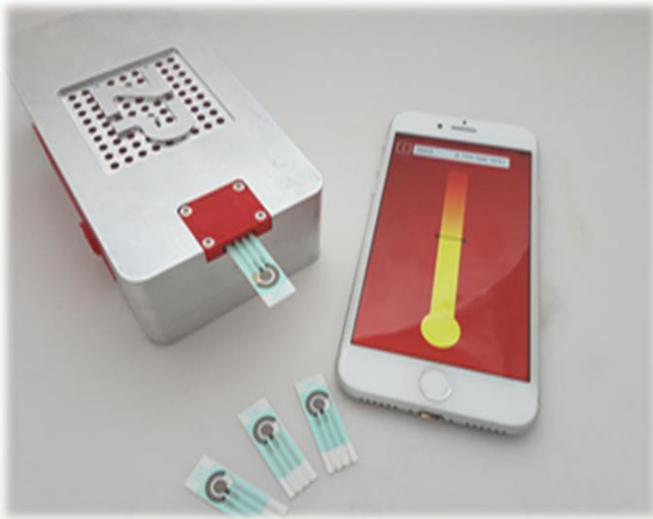
Can I download the ChilliPot App?

The ChilliPot App can be downloaded from the Apple App Store. Please note that the ChilliPot App only works in conjunction with the ChilliPot. Click the button below to download the App.



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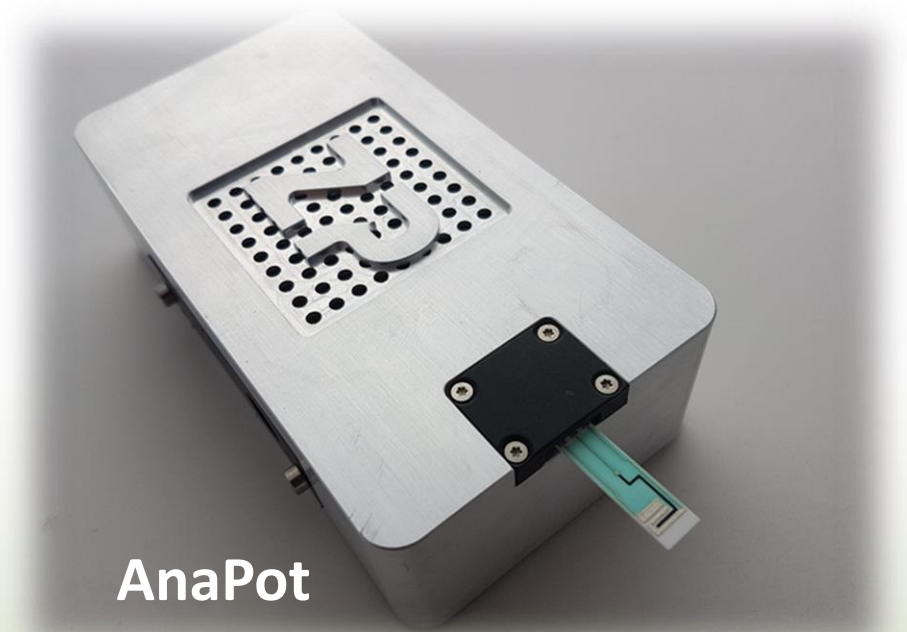
Sales and Marketing



Next steps – menu expansion

- Garlic
- Ginger
- Turmeric

Oxford University senses spicy deal with Zimmer and Peacock



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Time for practical

- ONE - Take buffer solution and record a cyclic voltammogram.
- TWO - To the solution add in a small amount of chilli sauce.
- THREE – Compare the two CVs.
- FOUR – Add in a bit more chilli sauce.
- FIVE – Overlay all the CVs, do the CVs increase or decrease with chilli sauce.
- SIX – Run the ChilliPot – Scoville Meter 😊

