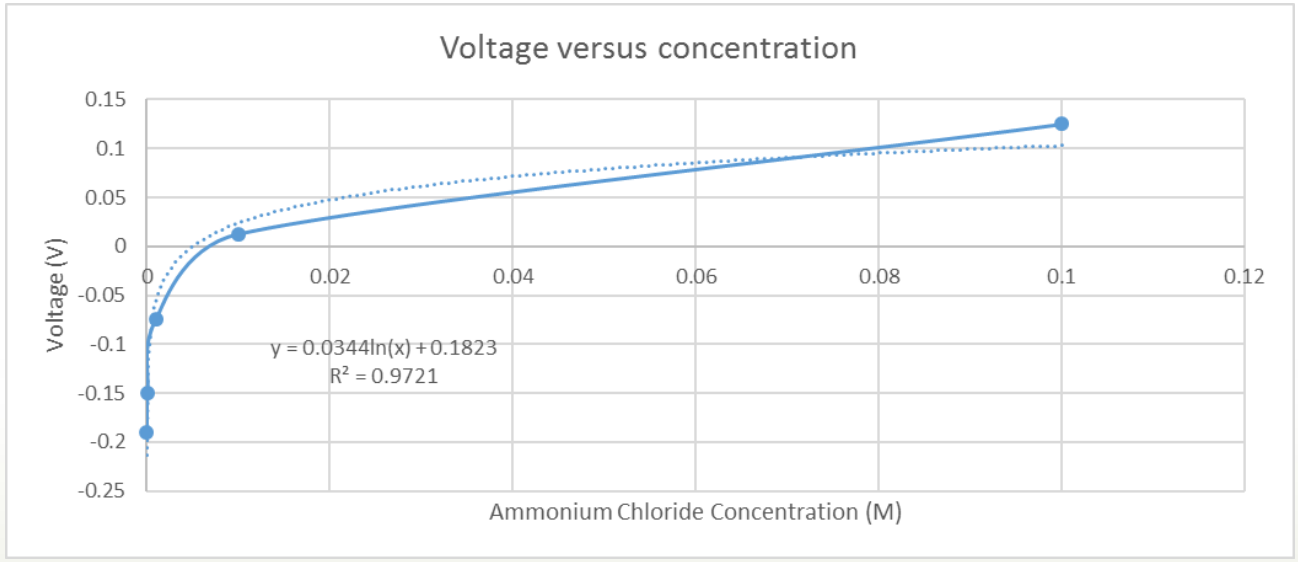
Zimmer & Peacock

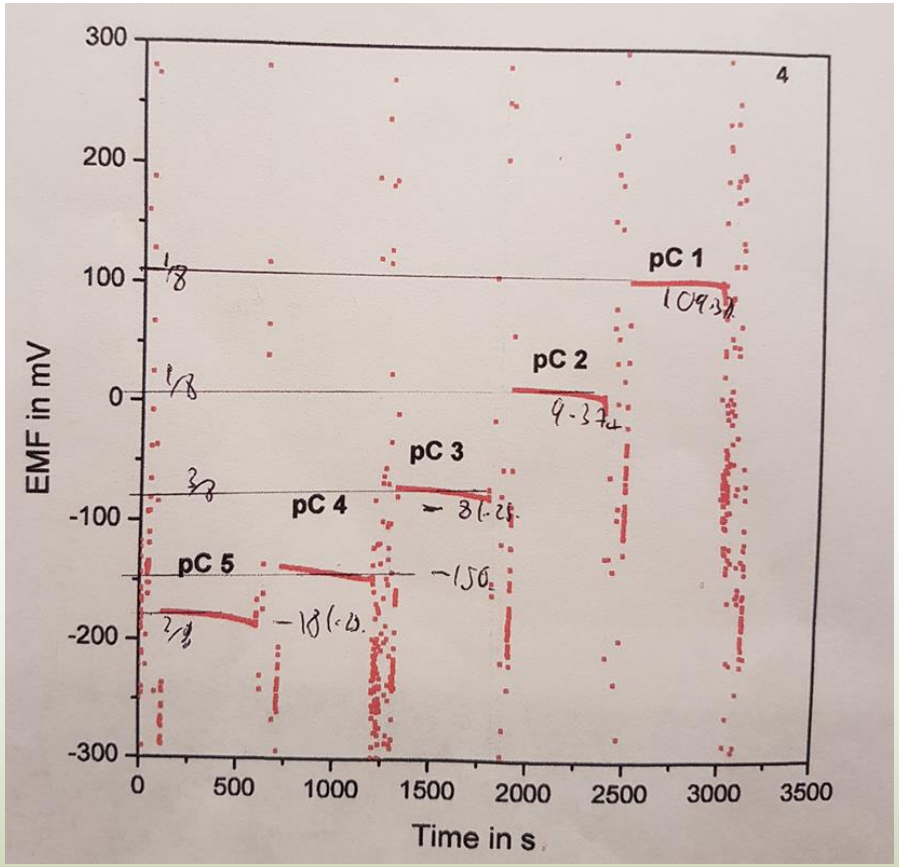
eSensor Manufacturing and Technology

In this short slide deck Martin Peacock explains his analysis

Analysis of raw data



Martin Peacock took the raw data and plotted voltage versus concentration, and got a best fit line.



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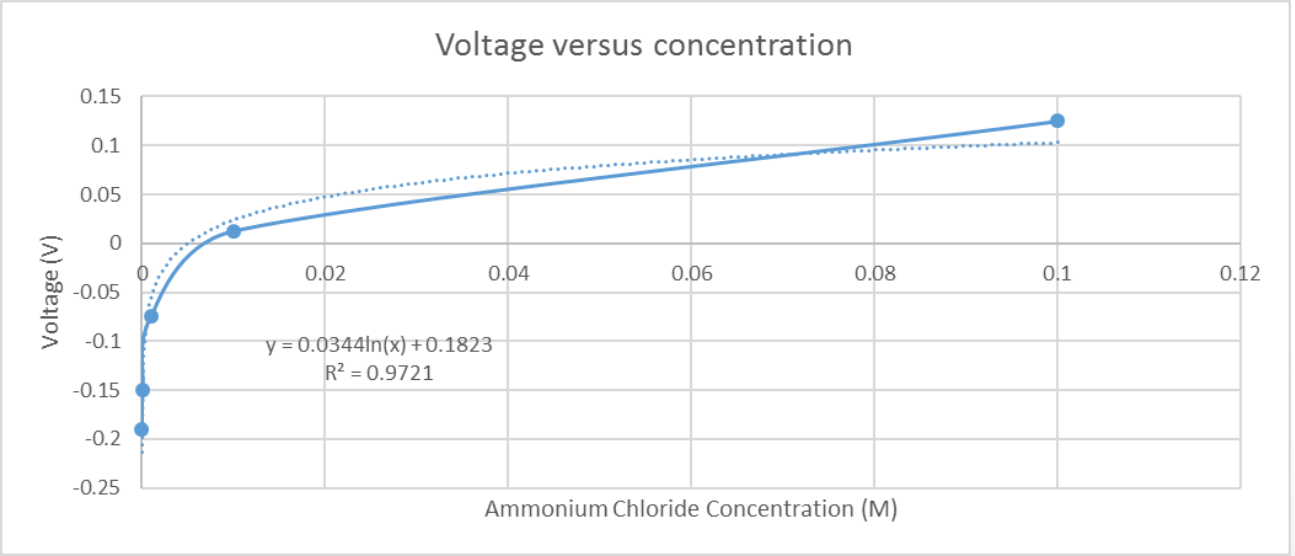
Analysis of raw data

- The equation of the best fit line for the raw data was

$$y = 0.0344\ln(x) + 0.1823$$
$$R^2 = 0.9721$$

The gradient of the logarithmic fit for the raw data was 34.4 mV



Martin Peacock took the raw data and plotted voltage versus concentration, and got a best fit line.

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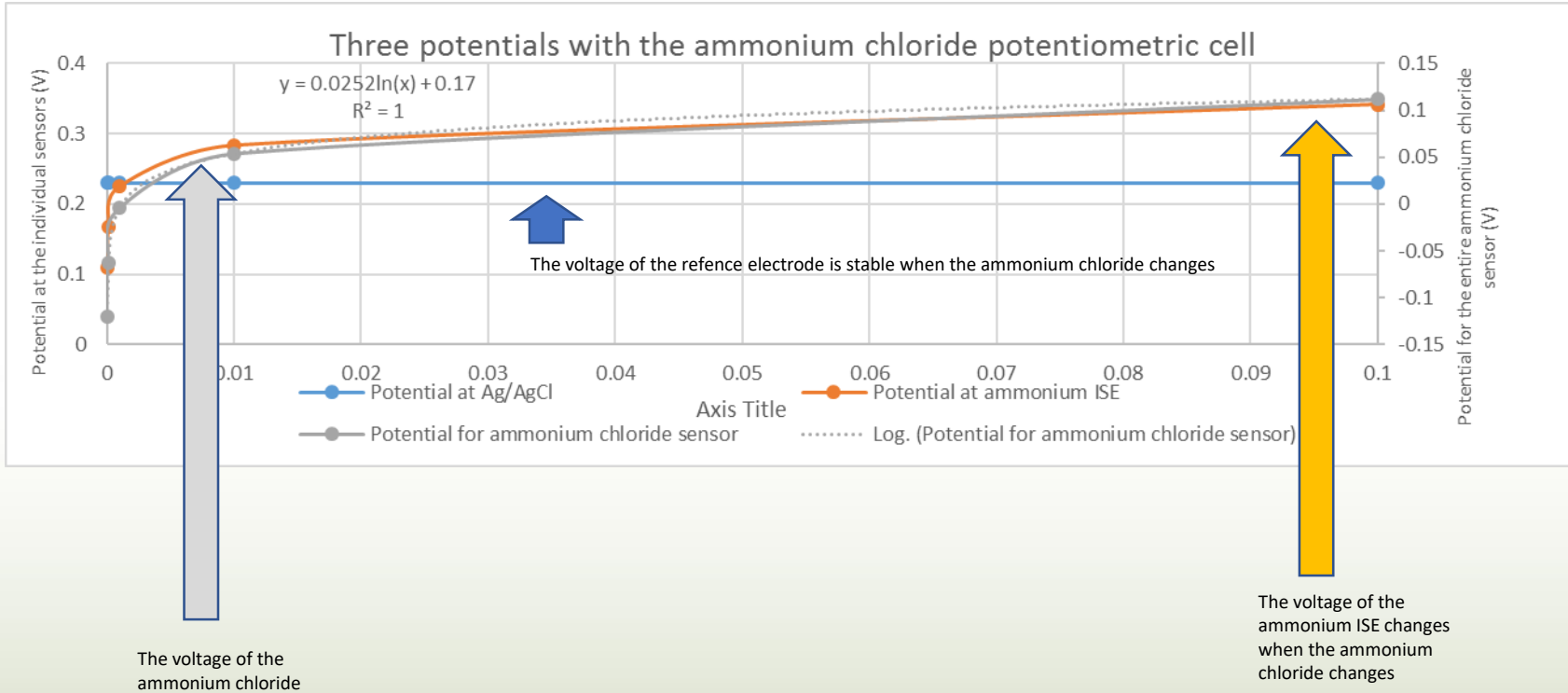
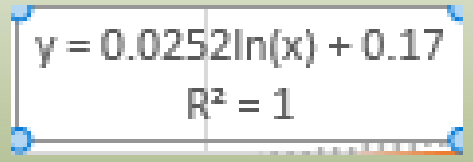
Next Step

- Next Martin built two models:
  - Model One where the Ag/AgCl reference electrode was stable and in no way changed with the chloride concentration.
  - Model Two where the Ag/AgCl was sensitive to chloride concentration, so as the ammonium chloride concentration changed both the ammonium ISE and the Ag/AgCl electrode responded to the ammonium chloride concentration.

Model One

- In model one the signal from the ammonium chloride is predicted by the ORANGE LINE minus the BLUE LINE resulting in the SILVER LINE
- The equation which described model one is below, note the 25mV gradient





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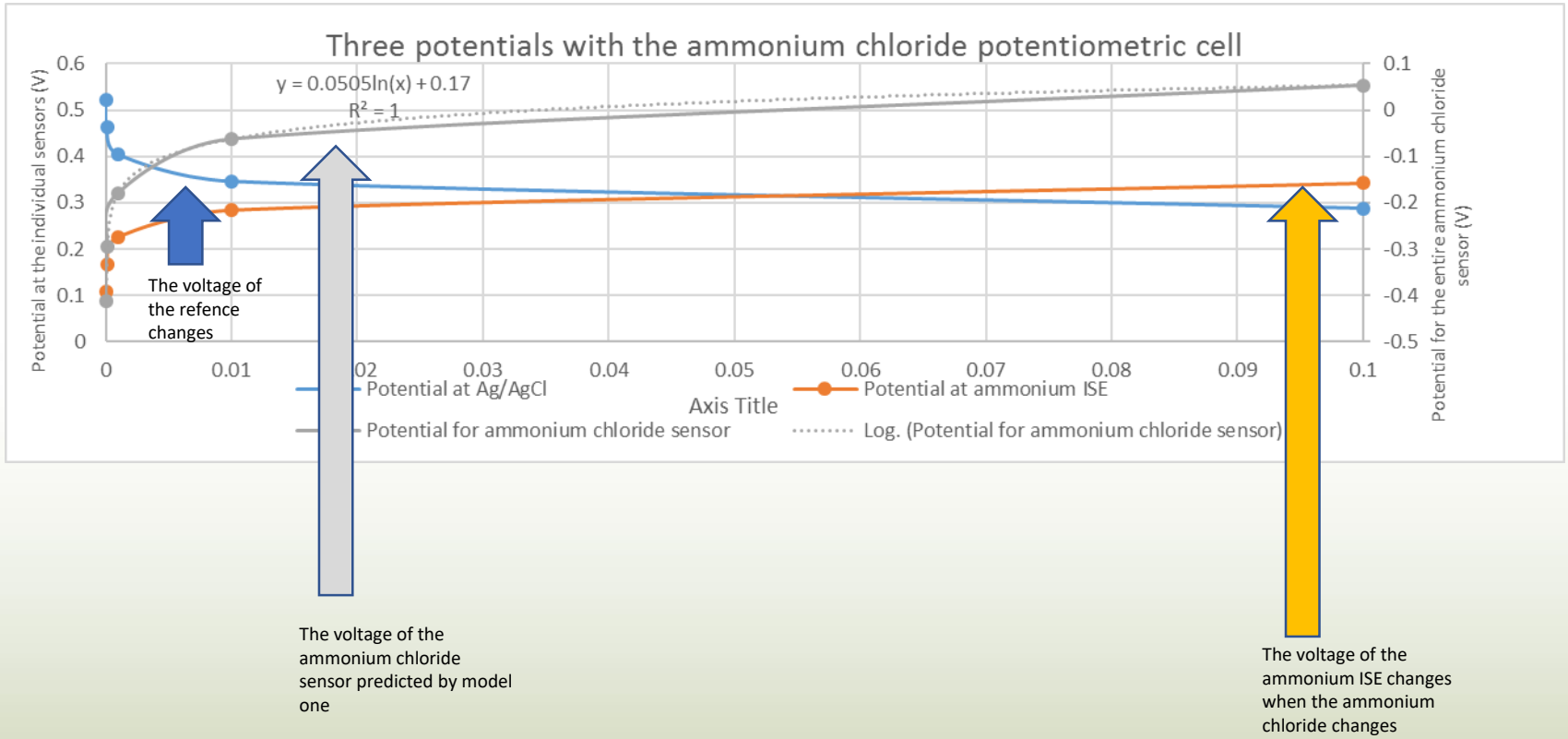
Model Two

- In this model the reference electrode (BLUE LINE) changes as the chloride associated with ammonium chloride changes
- In model two the signal from the ammonium chloride is predicted by the ORANGE LINE minus the BLUE LINE resulting in the SILVER LINE
- The equation which described model one is below, note the 50.5 mV gradient

$$y = 0.0505\ln(x) + 0.17$$
$$R^2 = 1$$



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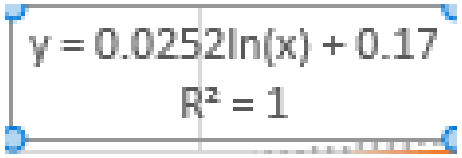
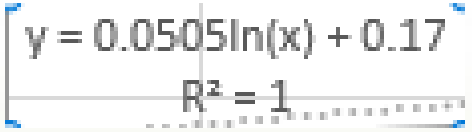
Which Model best describes the real data?

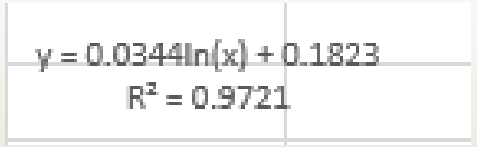
- Model One and Model Two are two extremes of how the sensor could work.
- When we compare the real data to the Models one is left thinking, the real data is somewhere between the two models and so we can conclude that the Ammonium chloride sensor is sensitive to ammonium and partially sensitive to chloride.



Model One



Model Two



Real Data

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