



# Master in Electrical and Electronics Engineering

EE-517: Bio-Nano-Chip Design

## Practical Session

Week 4

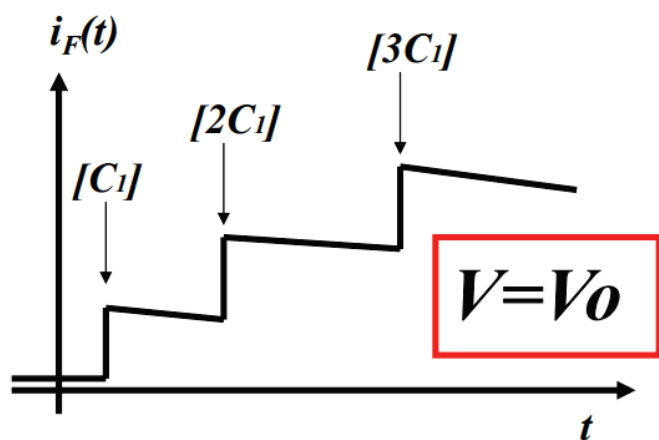
- Some practical concepts
- Projects

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## Faradaic currents from Chrono-Amperometry

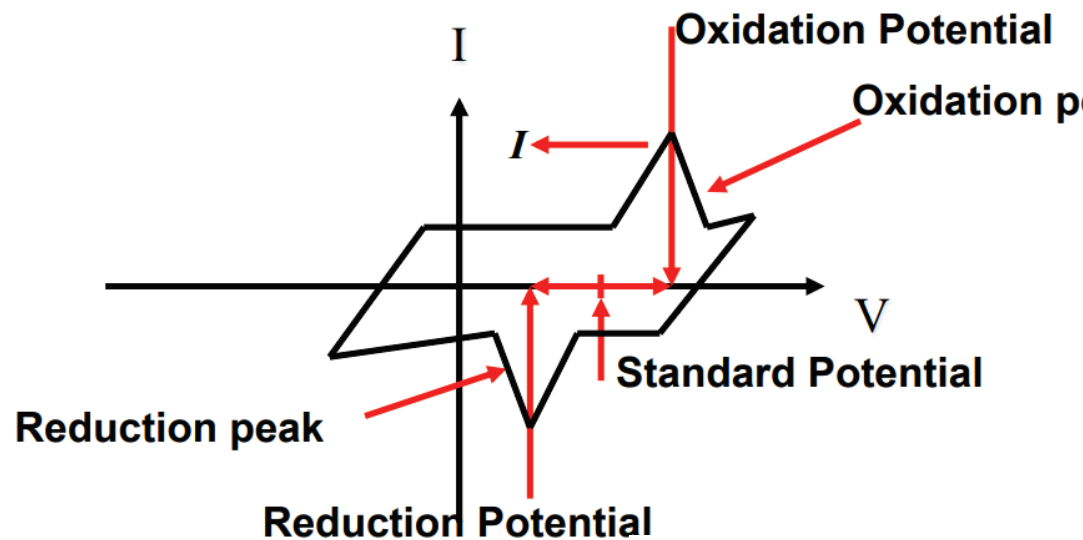


Cottrell equation

$$i = \frac{nFAC_0\sqrt{D}}{\sqrt{\pi t}}$$

Shows how the **current decays** with time when a fixed potential is applied

## Faradaic currents from Cyclic Voltammetry



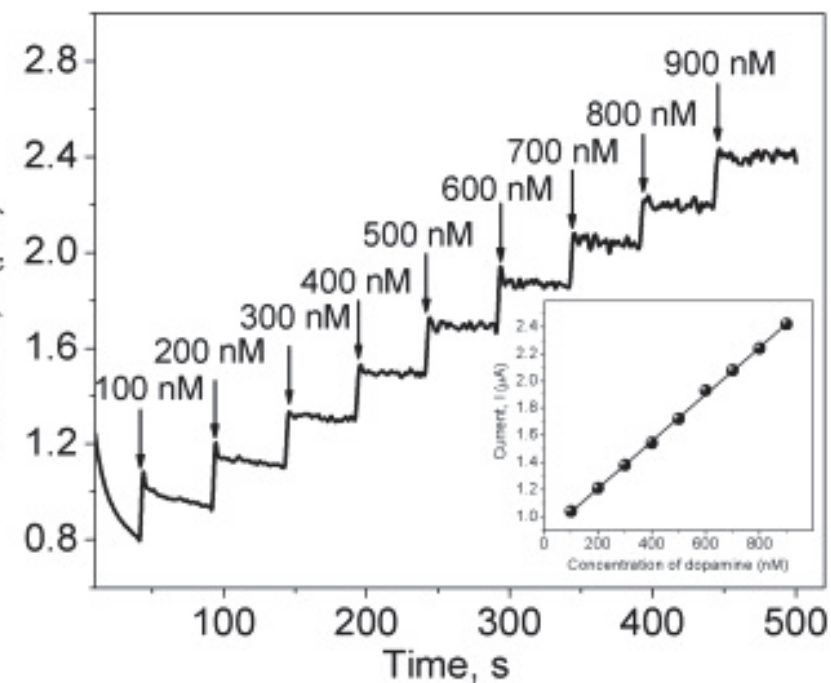
→ Randles–Sevcík equation

$$i_p = 0.4463 nFAC \sqrt{\frac{r}{t}}$$

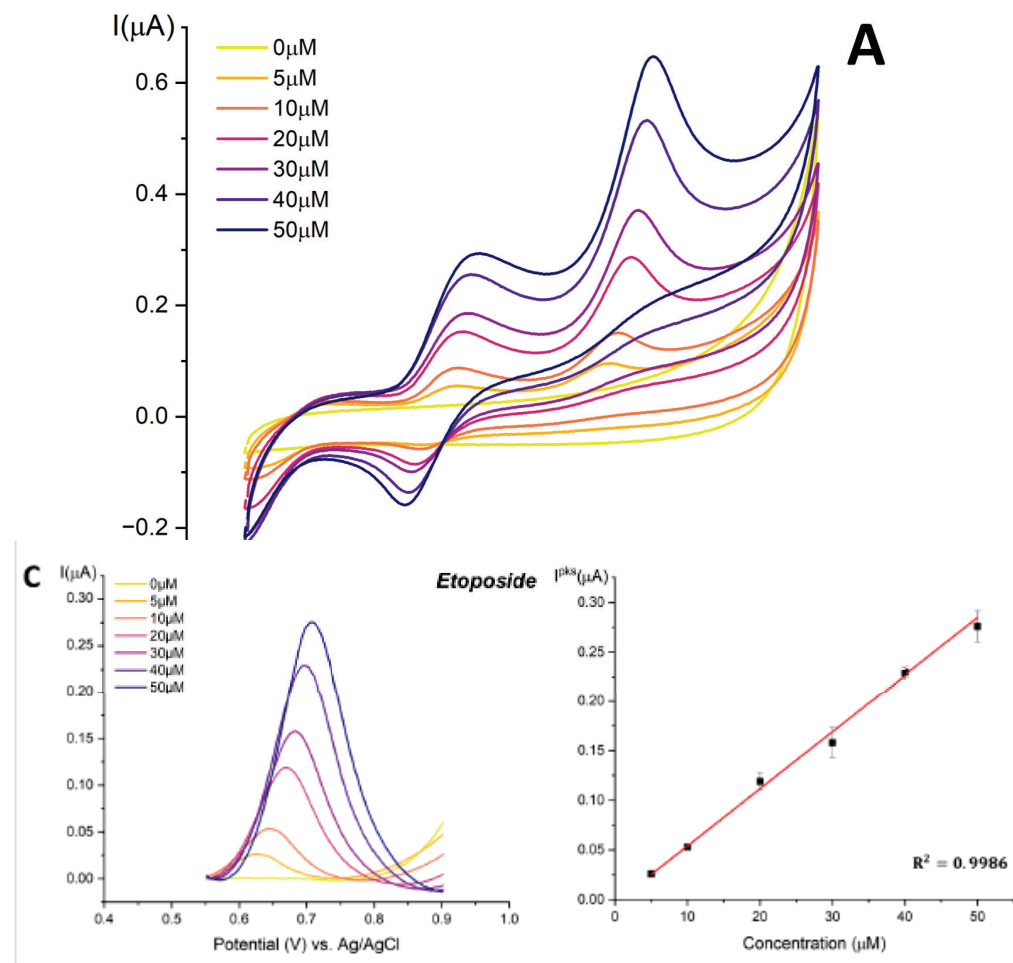
Links the **current peak (I<sub>p</sub>)** to the diffusion coefficient, concentration, and **rate**.

# Detection-Sensing- IN PRACTICE

## Chronoamperometry



## Cyclic voltammetry

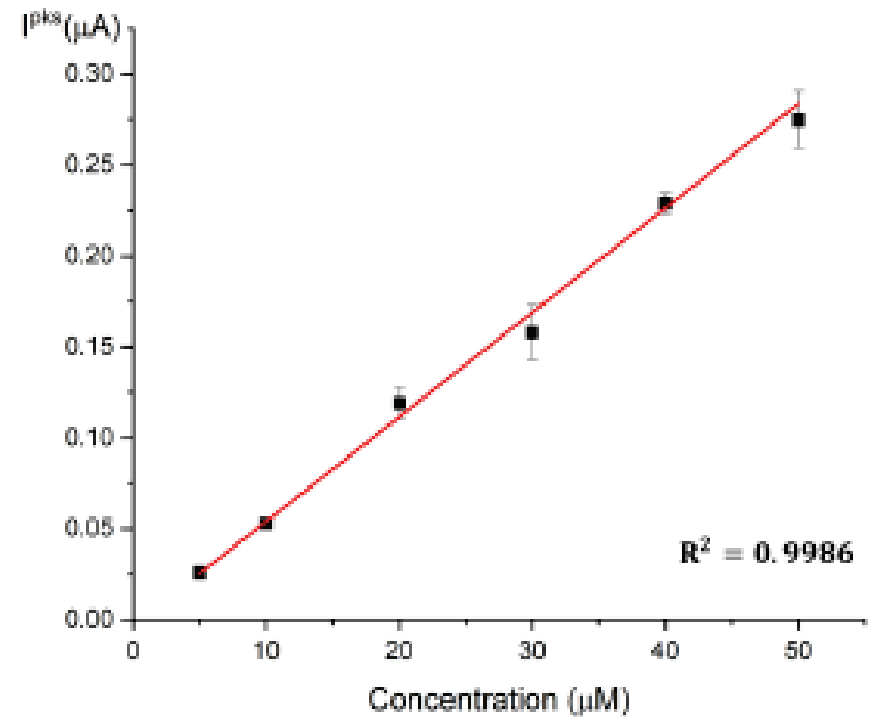


Mohammed, I., Nemakal, M., Aralekallu, S., Kumar, K. H., Swamy, S., & Sannegowda, L. K. Electrochemical sensing of dopamine. Journal of Electroanalytical Chemistry, 838, 33-40.

# Detection-Sensing- IN PRACTICE

What's important to extract?

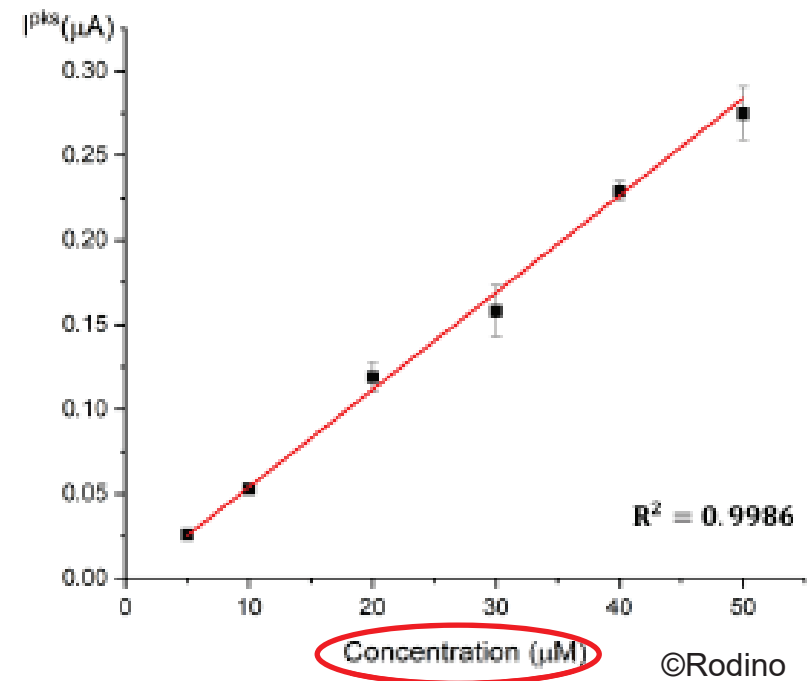
- **Sensitivity** (slope)
- **R<sup>2</sup>** (linearity)
- **LoD**



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# Detection-Sensing- IN PRACTICE

➤ How do we prepare a solution and different concentrations?



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# Detection-Sensing- IN PRACTICE

➤ How do we prepare a solution and different concentrations?

