

EDMI Microsystems and Microelectronics

MICRO-614: Electrochemical Nano-Bio-Sensing
and Bio/CMOS interfaces

Lecture #9

APPENDIX on nPt

Nanotechnology to enhance Electron Transfer

Lecture Outline

- How to integrate nanoPt
- Performance of nanoPt

Template-free Pt electrodepositions

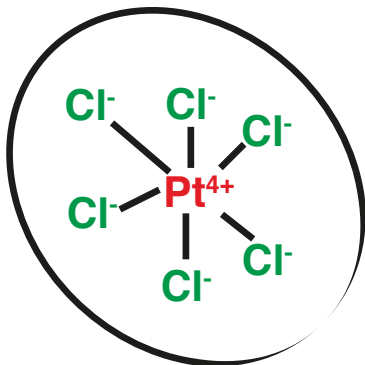
Parameters (P)

- **P1:** Applied Potential
- **P2:** Ratio Pt salt/H₂SO₄
- **P3:** Deposition Time

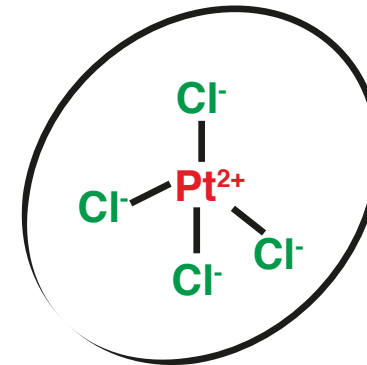
Level (L1,L2)

- (-1 V, -0.2 V)
- (0.006, 0.5)
- (90 s, 200 s)

Tetravalent Pt

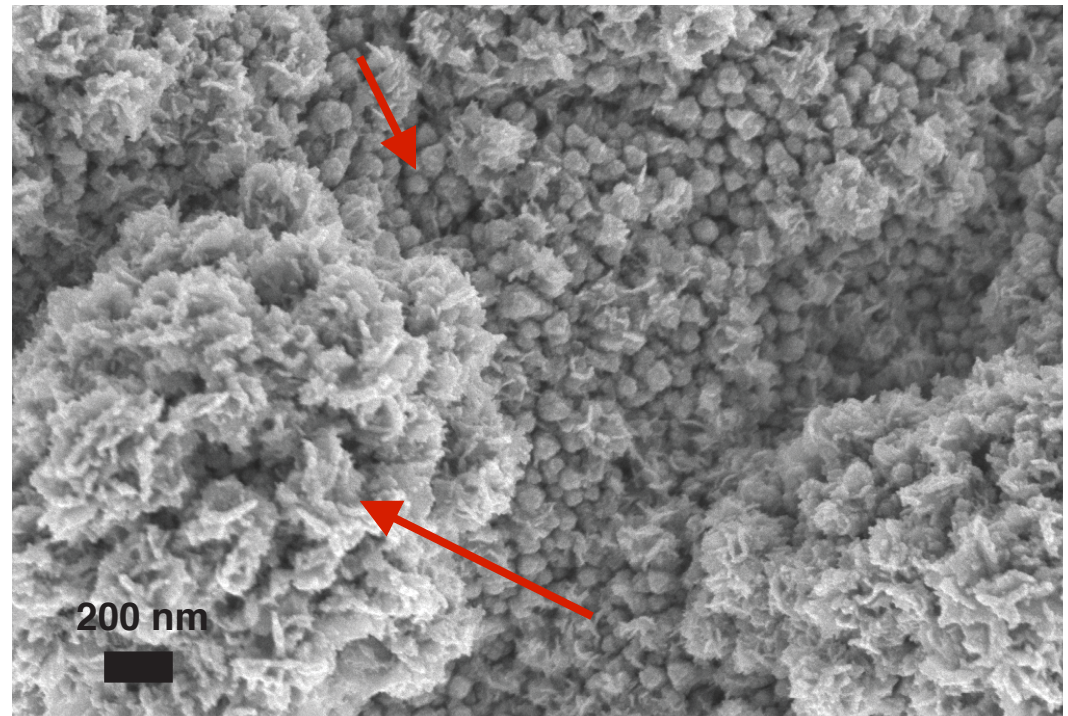
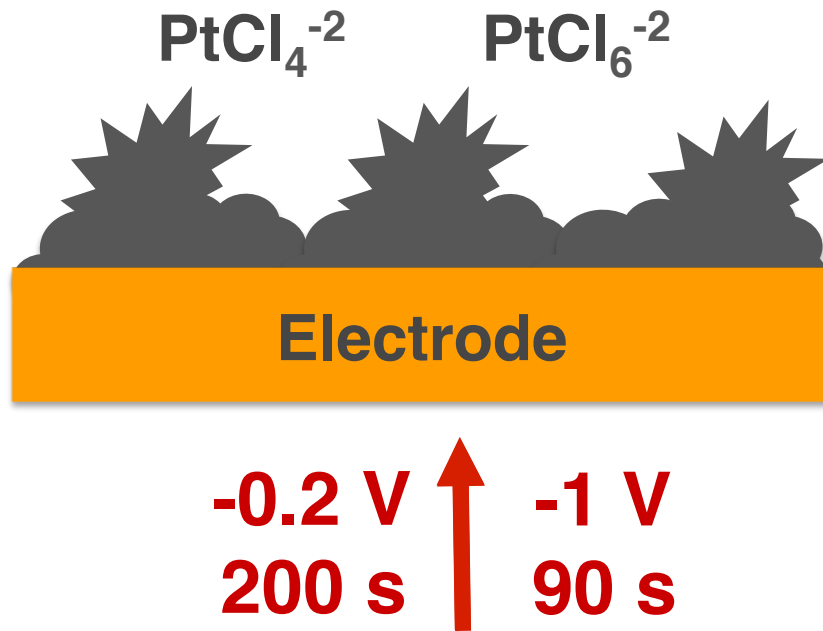


Divalent Pt



Nanopetal-decorated Nanospheres

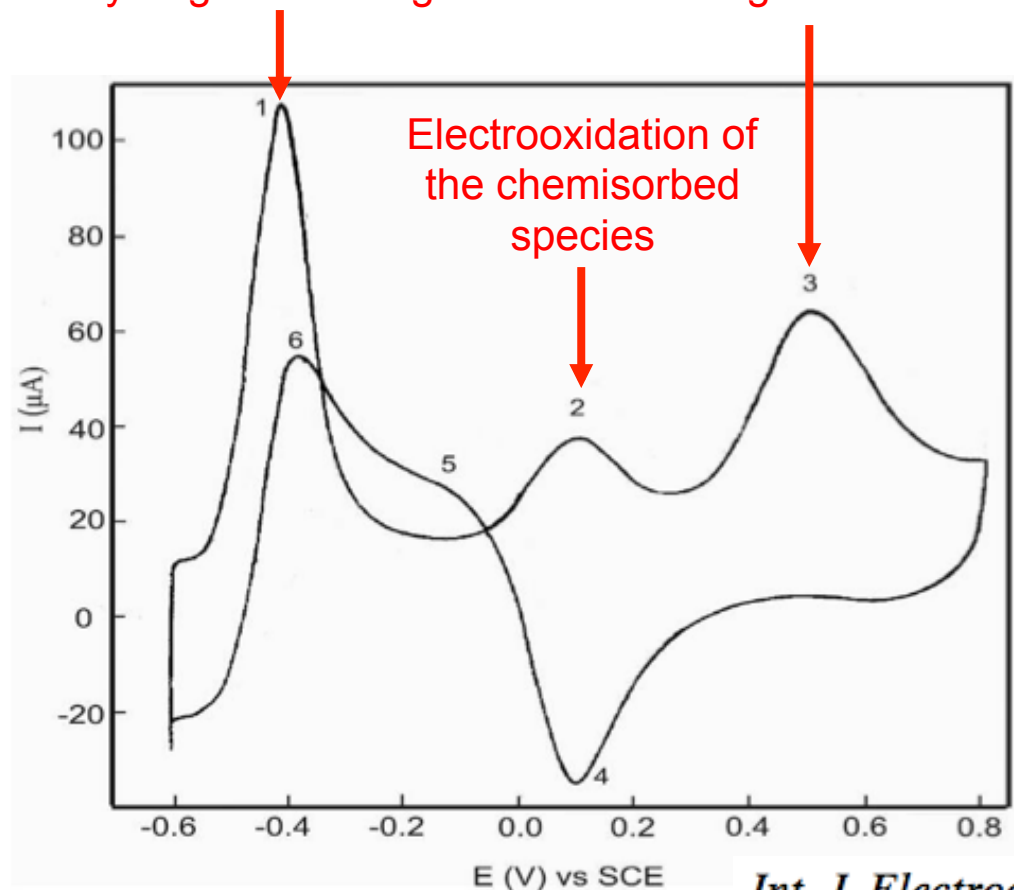
I. Taurino, et al., Scientific Report 5(2016) 15277/1-10



Direct Detection of Glucose

Chemisorption and dehydrogenation of glucose

Regeneration of the PtO layer.

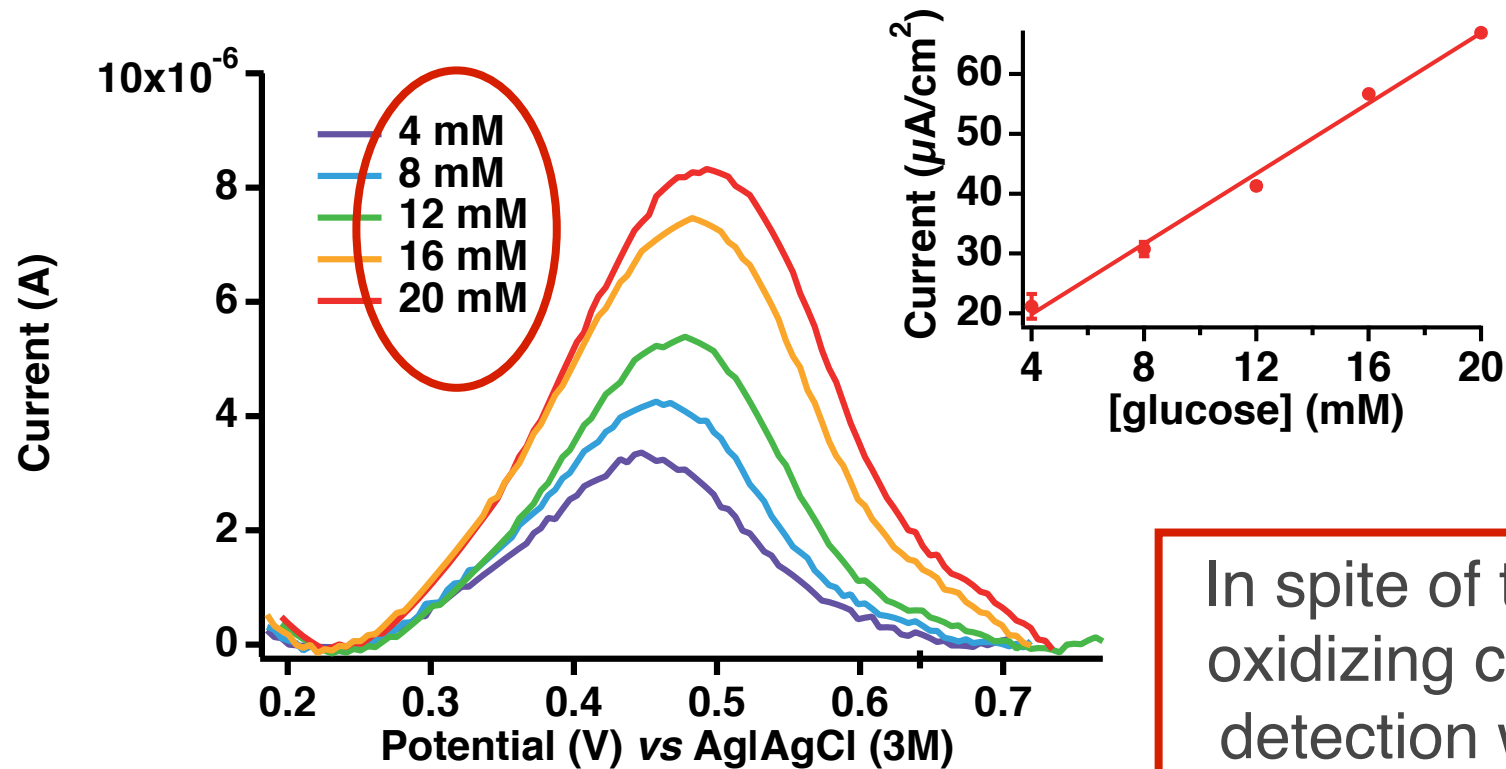


Int. J. Electrochem. Sci., Vol. 5, 2010

Non-Enzymatic methods to directly sense the glucose

(c) S.Carrara

Non-Enzymatic Glucose detection (in cell media!)

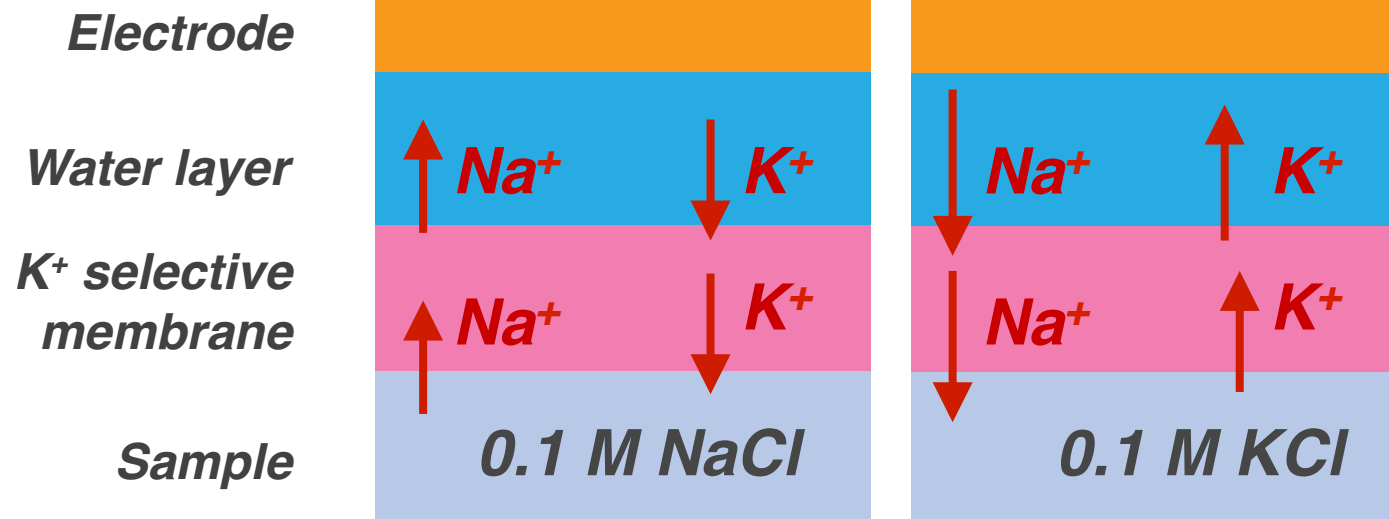
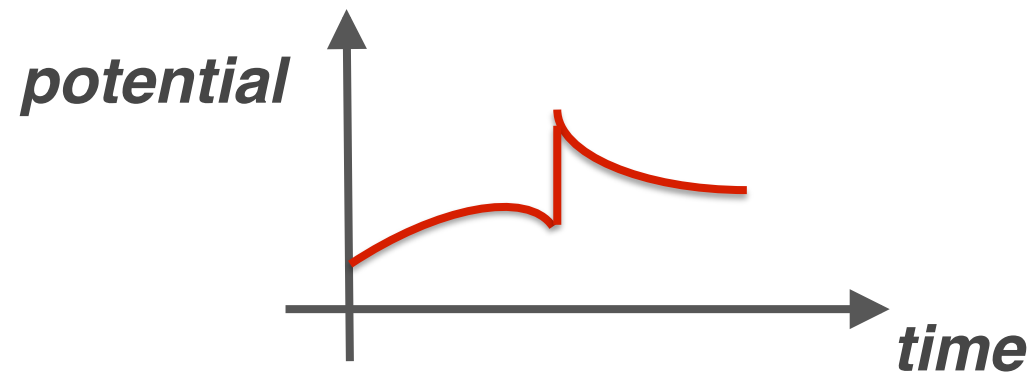


I. Taurino, et al., Scientific Report 5(2016) 15277/1-10

In spite of the strong oxidizing conditions, detection within the physio-pathological range

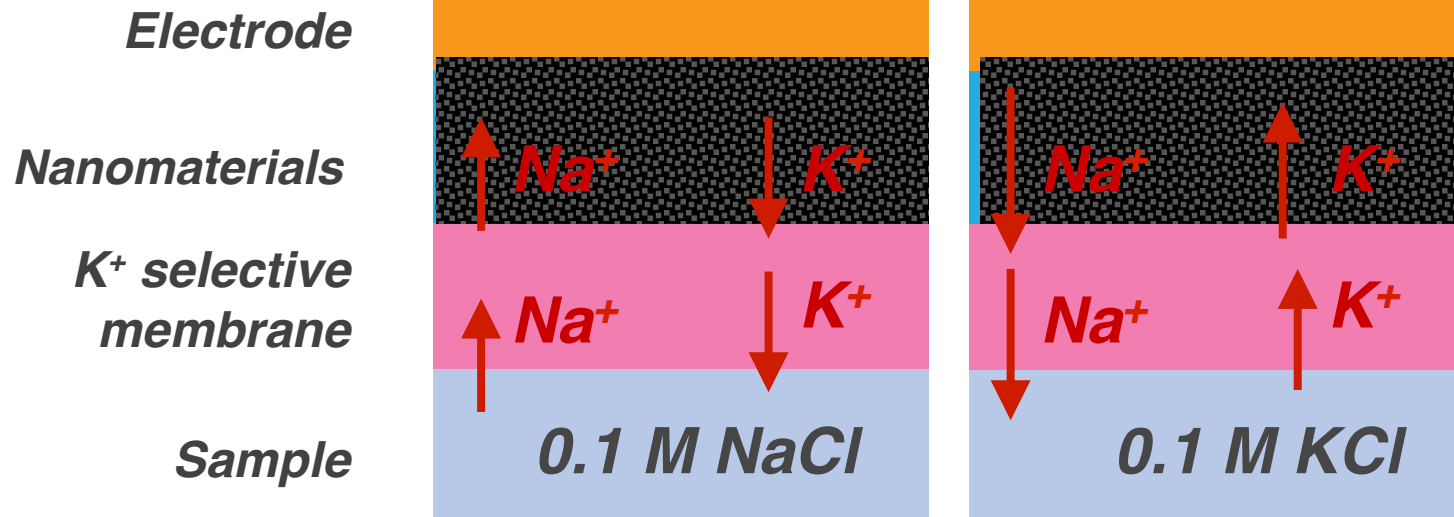
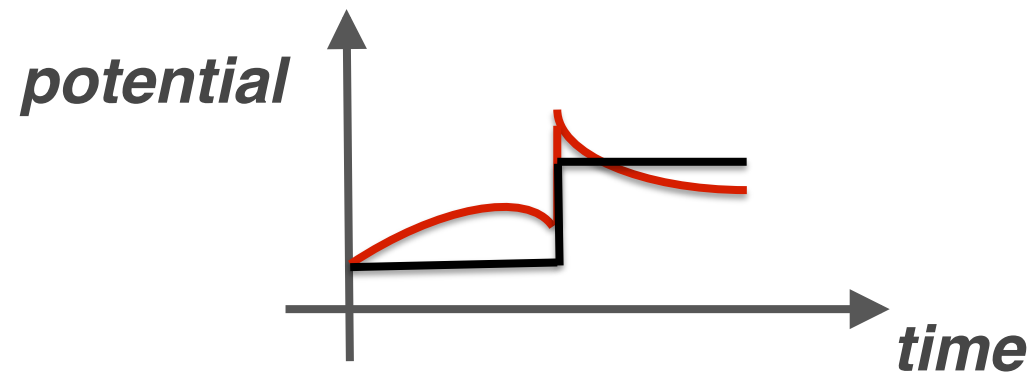
Response upon ionic changes

Water layer test



Response upon ionic changes

Water layer test



Response upon ionic changes

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Drift reduces from
mV/h to $\mu\text{V/h}$

- Pt bare K^+ selective electrode
- Pt nanopetals K^+ selective electrode
- Pt nanospheres K^+ selective electrode

