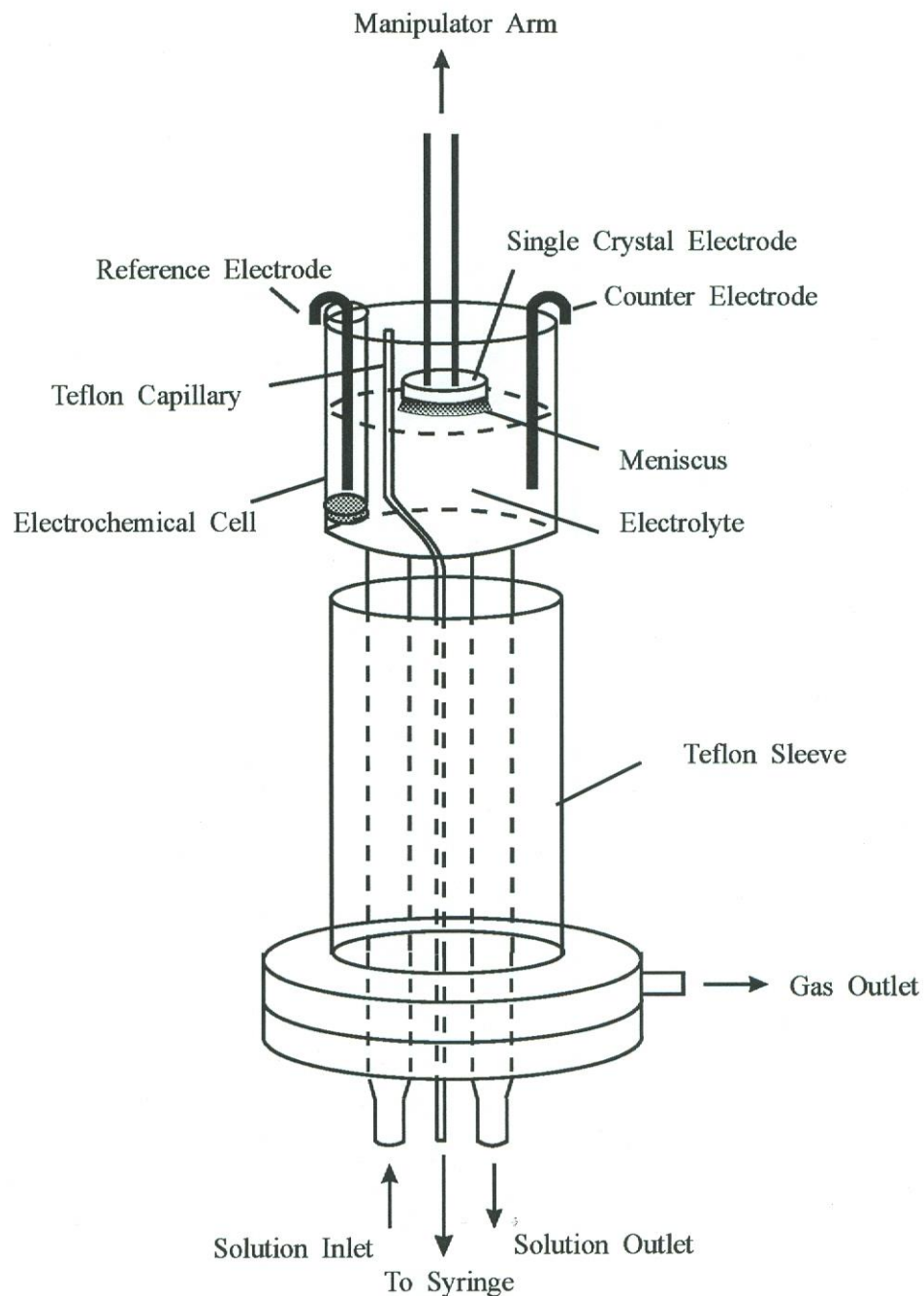


Lecture Note #12

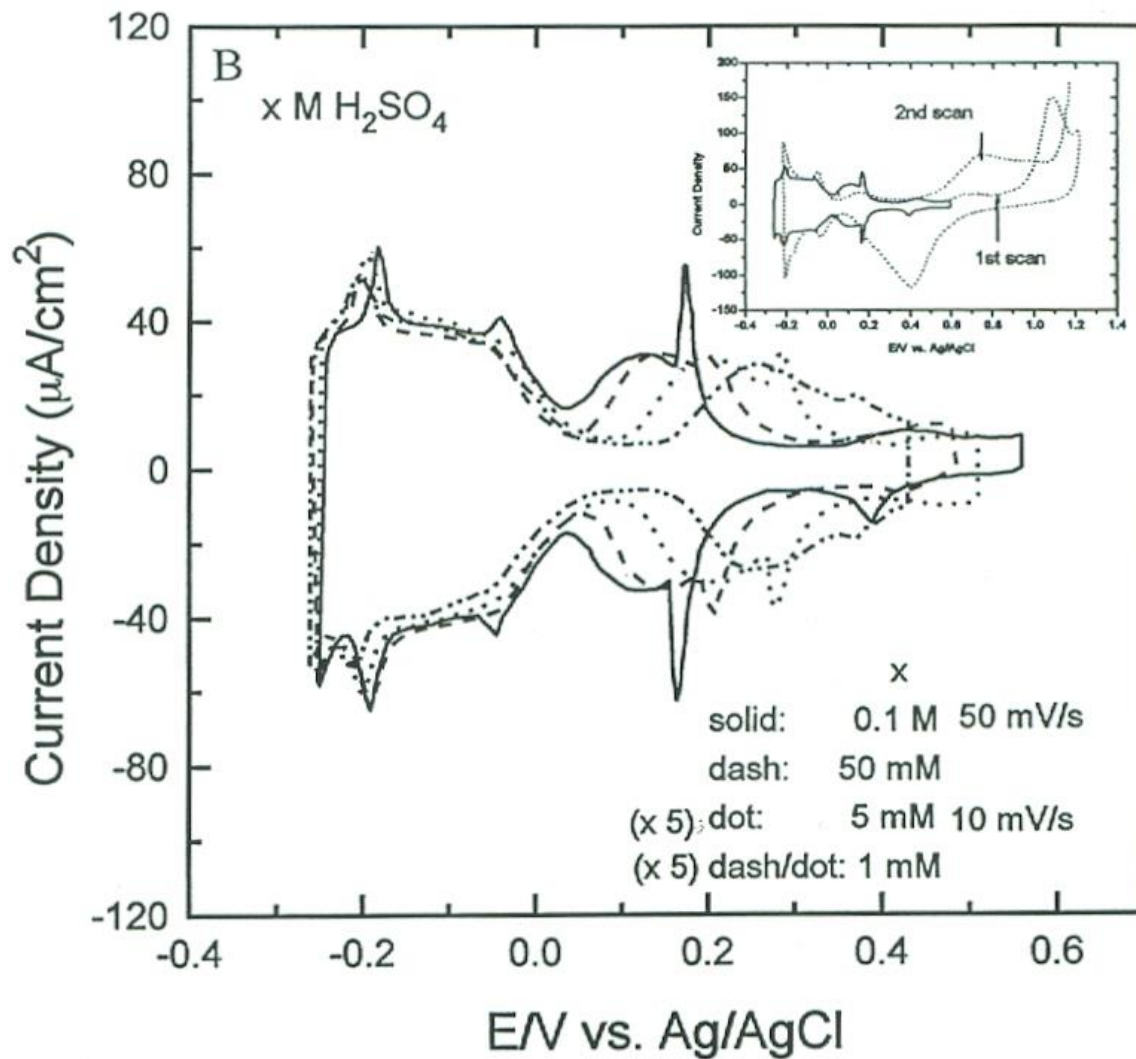
Example of *ex situ* experiment:

- (bi)sulfate on Pt(111) in H₂SO₄ electrolyte**
- Cu underpotential deposition on Au(111)**

ex situ cell for UHV-electrochemistry

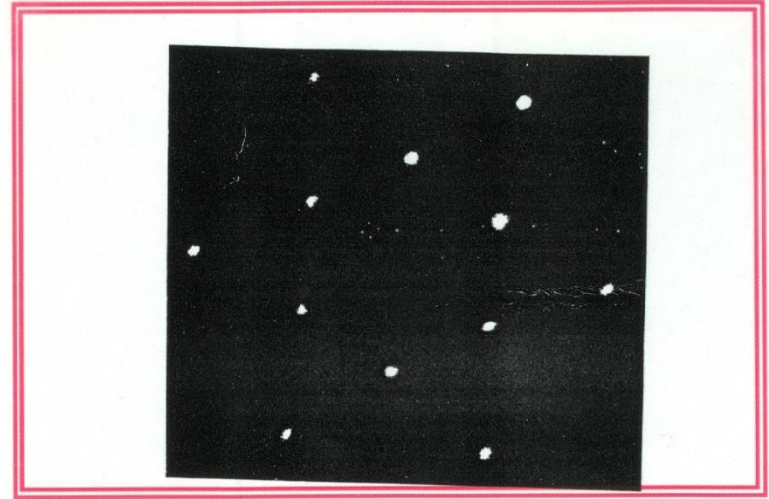


Cyclic voltammetry of Pt(111) in sulfuric acid solution



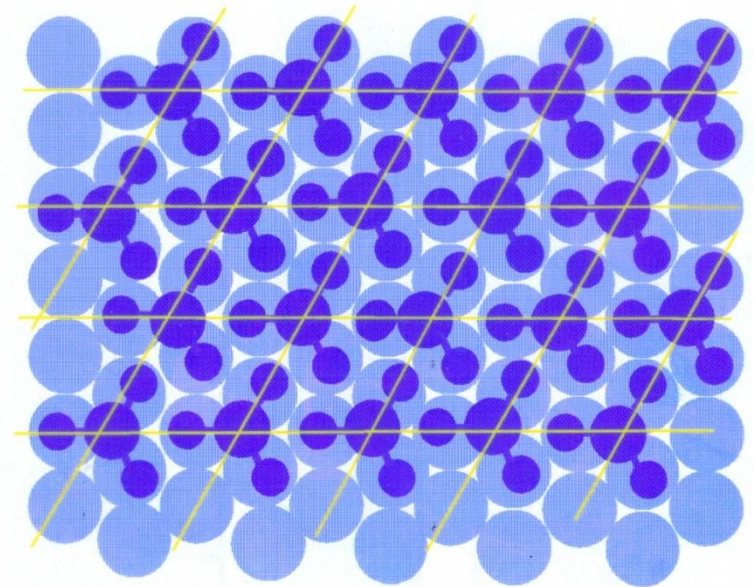
LEED (low energy electron diffraction)

Bisulfate/Pt(111)



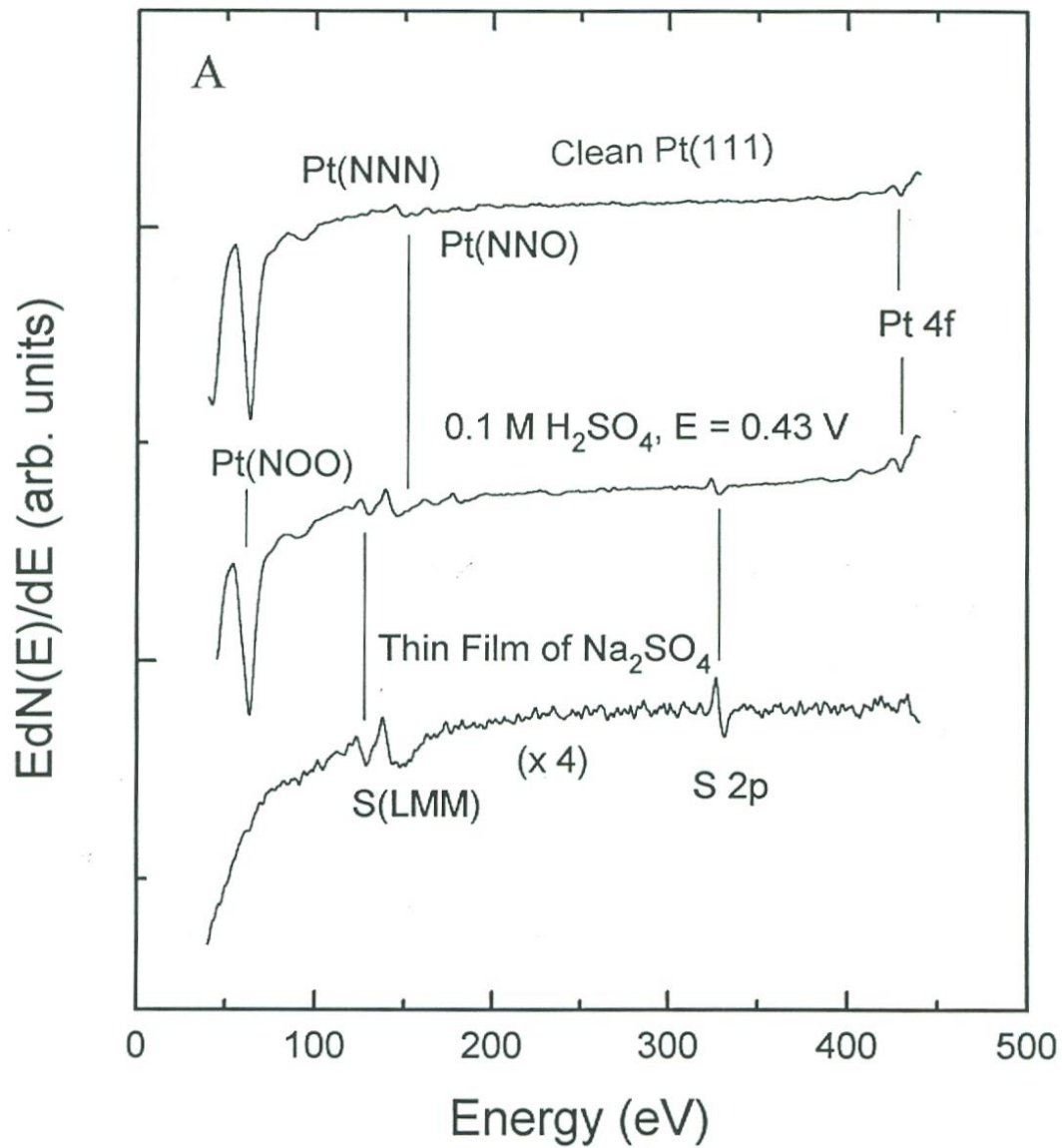
E = 0.34 V in 50 mM sulfuric acid

49.4 eV



$(\sqrt{3} \times \sqrt{3})R30^\circ$

Auger electron spectroscopy



Quantitative Auger electron spectroscopy

$$\frac{I(S)}{I(S,0)} = \frac{r(S)}{r(S,0)} \cdot X \cdot \frac{\lambda(S)}{\lambda(S,0)} \cdot [1 - \exp(-t / (\lambda(S)\cos\alpha))]]$$

$$\frac{I(Ox)}{I(Ox,0)} = \frac{r(Ox)}{r(Ox,0)} \cdot Y \cdot \frac{\lambda(Ox)}{\lambda(Ox,0)} \cdot [1 - \exp(-t / (\lambda(Ox)\cos\alpha))]]$$

$$X = \frac{M(S)}{M(S,0)} \text{ for sulfur, } Y = \frac{M(Ox)}{M(Ox,0)} \text{ for oxygen}$$

I: AES intensity ($I(S)$: surface, $I(S,0)$: bulk (from Na_2SO_4)

r: backscattering factor (계산 가능)

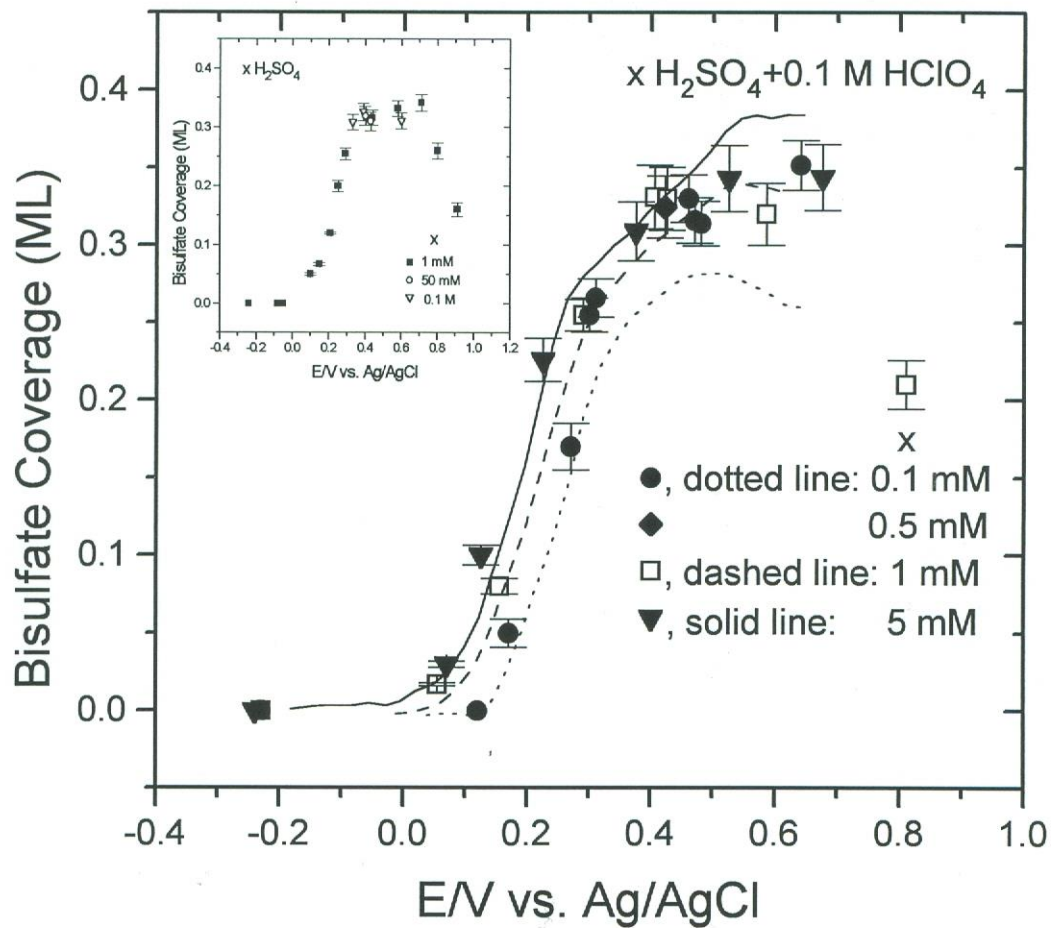
λ : inelastic mean free path (계산 가능)

t: overlayer thickness. **α :** electron escape angle (42.3° in CMA)

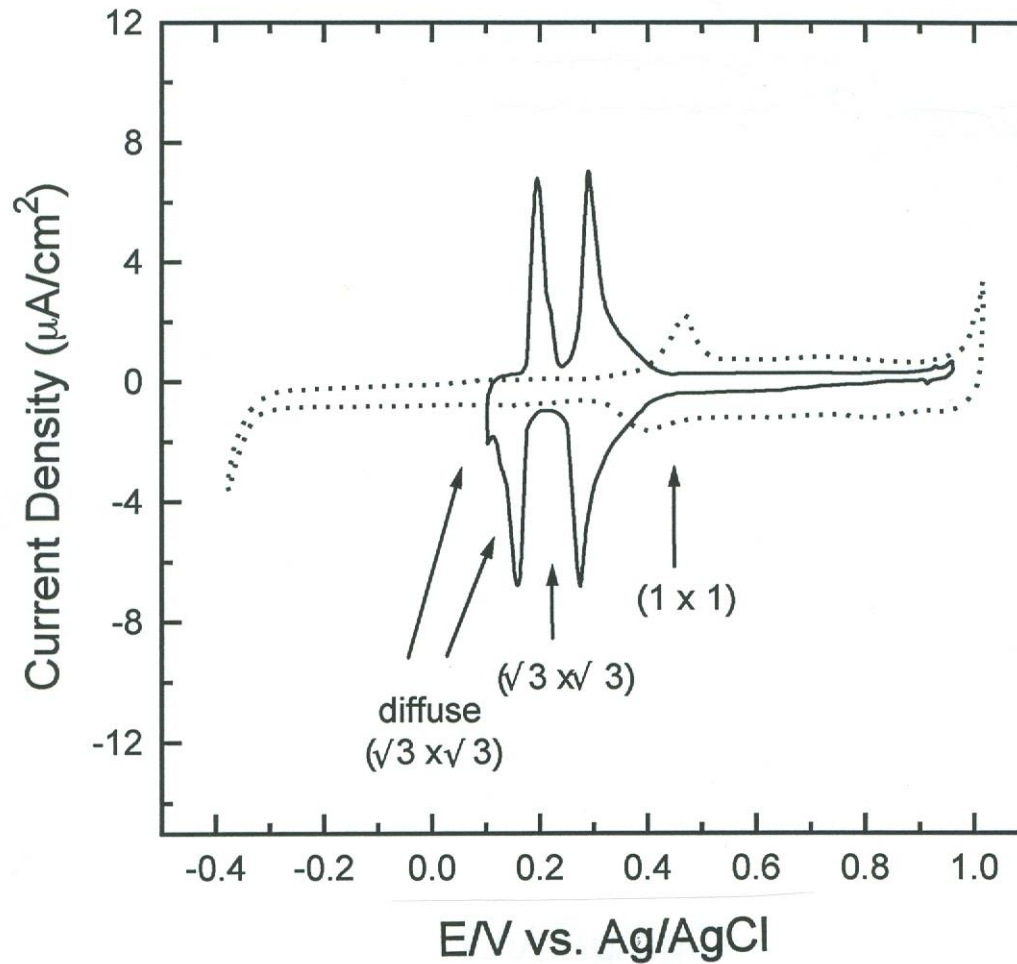
$M(S,0)$: mean atomic density of sulfur in Na_2SO_4 ($1/\text{cm}^3$)

→ **$M(S)$ (mean atomic density of sulfur in the overlayer)**를 구하는 문제

in situ (CV) vs. *ex situ* (LEED, AES)



Cu underpotential deposition on Au(111)



Quantitative AES vs. *in situ* CV for Cu UPD

