The Electrode Interface

Lecture 16

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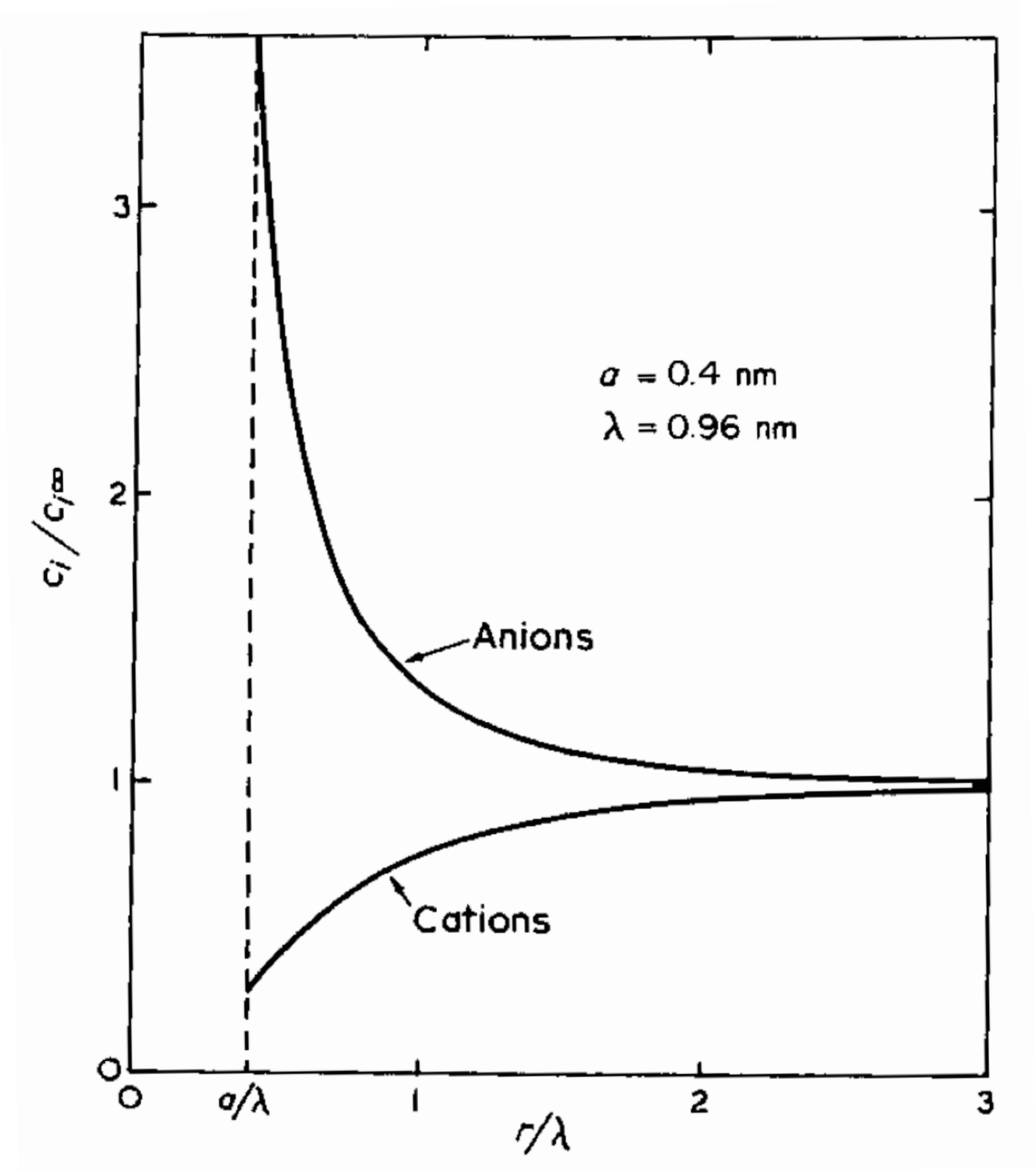
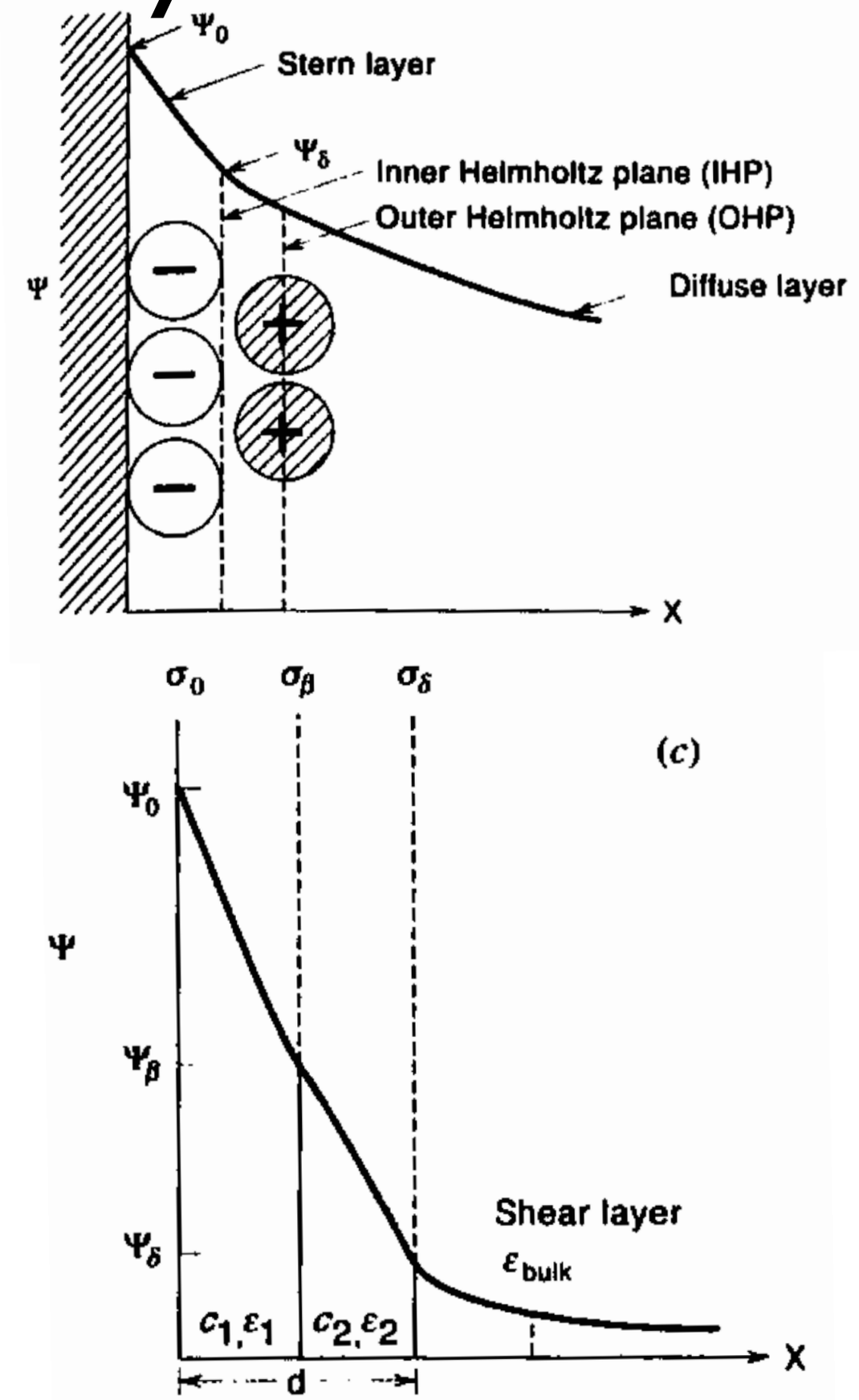
The Electrode-Electrolyte Interface





The Electrode-Electrolyte Interface

$$\nabla^2\phi = \frac{zec^*}{\varepsilon_r\varepsilon_o}\sinh\frac{ze\phi}{k_bT} - \frac{\rho_o(x,y,z)}{\varepsilon_r\varepsilon_o} \longrightarrow$$

non-linear equation

$$\nabla^2\phi = \frac{z^2e^2c^*}{\varepsilon_r\varepsilon_o k_bT}\phi - \frac{\rho_o(x,y,z)}{\varepsilon_r\varepsilon_o} \longrightarrow$$

linearized equation

$$\kappa^2 = \frac{z^2e^2c^*}{\varepsilon_r\varepsilon_o k_bT}$$

Debye constant

The Butler-Volmer Relation

$$Li \rightleftarrows Li^+ + e^-$$

Detailing the rate at which Li intercalates

$$LiM \leftrightarrows e^- + Li^+ + M$$

$$i_\circ = F k_r (c_T - c_s)^{\alpha_a} c_s^{\alpha_c}$$

The simplest interfacial kinetics

$$\vec{J} \cdot \hat{n} = i_\circ \left(\exp(\frac{\alpha_a F z \eta}{RT}) - \exp(-\frac{\alpha_c F z \eta}{RT}) \right)$$