

NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Chemistry and Biochemistry - NOC:Electrochemical Impedance Spectroscopy

Subject Co-ordinator - Dr. S. Ramanathan

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Electrochemistry, double layer, 3 electrode systems, supporting electrolyte
Lecture 2 - Rate constant, concept of impedance, Z of electrical elements, differential impedance
Lecture 3 - Time domain results
Lecture 4 - Graphical representation of data (Complex plane, Bode)
Lecture 5 - Introduction to other techniques
Lecture 6 - Tutorial 01
Lecture 7 - Type of analyzers, single and multi sine
Lecture 8 - FFT details, frequency range and resolution, cross correlation
Lecture 9 - Multi sine, odd harmonic, non-harmonics, crest factor, spectral leakage
Lecture 10 - Windowing
Lecture 11 - Tutorial 02
Lecture 12 - Introduction to KKT
Lecture 13 - Linearity, causality, stability, impedance vs. admittance, measurement model
Lecture 14 - Linear KKT illustration
Lecture 15 - Tutorial 03
Lecture 16 - Introduction to EEC, Choice of circuits, confidence intervals, AIC
Lecture 17 - EEC fitting, initial values, distinguishability
Lecture 18 - Zero/pole representation, R_t and R_p
Lecture 19 - Maxwell, Voigt, Ladder circuits, choice of initial values illustrated
Lecture 20 - Tutorial 04
Lecture 21 - Simple electron transfer reaction
Lecture 22 - Two step reaction with an intermediate (1 of 3)
Lecture 23 - Two step reaction with an intermediate (2 of 3)
Lecture 24 - Two step reaction with an intermediate (3 of 3)
Lecture 25 - E-EAR reaction, negative resistance (1 of 2)
Lecture 26 - E-EAR reaction, negative resistance (2 of 2)
Lecture 27 - Three step reaction with two adsorbed intermediates
Lecture 28 - Catalytic mechanism
Lecture 29 - Examples with Frumkin or Temkin isotherms

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- Lecture 30 - Challenges in RMA
- Lecture 31 - Patterns Reported in Experiments
- Lecture 32 - Warburg part - 1
- Lecture 33 - Warburg part - 2
- Lecture 34 - Warburg part - 3
- Lecture 35 - Bounded Warburg
- Lecture 36 - CPE
- Lecture 37 - Porous electrodes
- Lecture 38 - Films, PDM
- Lecture 39 - PDM
- Lecture 40 - Applications
- Lecture 41 - NLEIS. Introduction and mathematical background
- Lecture 42 - Electron Transfer reaction
- Lecture 43 - Two step reaction
- Lecture 44 - Two step reaction (Continued...)
- Lecture 45 - R_t and R_p estimation
- Lecture 46 - Galvanostatic simulations
- Lecture 47 - Instabilities
- Lecture 48 - Solution resistance effects
- Lecture 49 - Detection on nonlinearities using KKT
- Lecture 50 - Frumkin and Temkin isotherms
- Lecture 51 - NLEIS Experimental aspects. FFT, PSD, THD
- Lecture 52 - Application - other techniques HA, EFM