

PHD STUDIES COURSE UNIT DESCRIPTION

Name of subject	Field of science, code	Faculty / Center	Department
Methods used for the evaluation of electrochemical processes	Chemistry N 003	Faculty of Chemistry and Geosciences	Physical chemistry
Student's workload	Credits	Student's workload	Credits
Lectures		Consultations	
Independent study	10	Seminars	

Course annotation

Structure and design of electrochemical cells.
 Backgrounds of electrochemical thermodynamics: electrode potentials, structure of 'double layers' formed on the electrode surface.
 Mechanisms of electrochemical reactions.
 Complex electrochemical reactions.
 Modelling of electrochemical reactions.
 Experimental methods used for the evaluation of electrochemical reaction mechanisms.
 The influence of temperature on chemical reaction rate.
 The influence of solvents on chemical reactions.
 Catalysis in electrochemical reactions.
 Homogeneous and heterogenic catalysis in electrochemical.
 Adoption and diffusion in electrochemical reactions.
 Mathematical modelling of electrochemical processes.

Reading list

1. H.D.Abruna (Ed.), Electrochemical interfaces: modern techniques for in-situ interface characterization, VCH Publishers, Inc., 1991.
2. P.A. Christensen, A. Hamnett, Techniques and Mechanisms in Electrochemistry, Kluwer Academic Publishers 1994.
3. H. Czychos, T. Saito, L. Smith (Eds.), Springer Handbook of Materials Measurement Methods, Springer Science+ Business Media, Inc., 2006.
4. K.S. Birdi, Scanning Probe Microscopes: Applications in Science and Technology, CRC Press, LLC, 2003.
5. M. Orazem, B. Tribollett, Electrochemical Impedance Spectroscopy, A John Wiley & Sons, INC., 2008.
6. K. Izutsu, Electrochemistry in Nonaqueous Solutions, Wiley-VCH Verlag GmbH & Co., 2002.
7. A. J. Bard, L. R. Faulkner. Electrochemical Methods, Fundamentals and Applications, 2nd ed. 2001. John Wiley and Sons.
8. L.Gortin (Ed.), Biosensors and modern biospecific analytical techniques, in: Comprehensive Analytical Chemistry, vol. 44. Elsevier, 2007, 635 p.
9. Atkins P., Paula J.Physical Chemistry for the Life Sceinces Oxford University Press, 2006.
10. 1. Bockris, J. O'M., Reddy, A.K. N., Gamboa-Aldeco, M. Modern electrochemistry, 2nd ed. Plenum Press: New York, 1998. 3 v. (2053 p)

The names of consulting teachers	Science degree	Main scientific works published in a scientific field in last 5 year period
Arūnas Ramanavičius	Habil.dr.	<p>I. Plikusiene, V. Maciulis, O. Graniel, M. Bechelany, S. Balevicius, V. Vertelis, Z. Balevicius, A. Popov, A. Ramanavicius, A. Ramanaviciene. Total internal reflection ellipsometry for kinetics-based assessment of bovine serum albumin immobilization on ZnO nanowires. Journal of Materials Chemistry C 2021, 9, 1345-1352.</p> <p>I. Plikusiene, V. Maciulis, A. Ramanaviciene, Z. Balevicius, E. Buzavaite-Verteliene, E. Ciplys, R. Slibinskas, M. Simanavicius, A. Zvirbliene, A. Ramanavicius. Evaluation of Kinetics and Thermodynamics of Interaction between Immobilized SARS-CoV-2 Nucleoprotein and Specific Antibodies by Total Internal Reflection Ellipsometry. Journal of Colloid and Interface Science. 2021, 594, 195–203.</p>

		<p>I. Plikusiene, Z. Balevicius, A. Ramanaviciene, J. Talbot, G. Mickiene, S. Balevicius, A. Stirke, A. Tereshchenko, L. Tamosaitis, G. Zvirblis, A. Ramanavicius. Evaluation of affinity sensor response kinetics towards dimeric ligands linked with spacers of different rigidity: immobilized recombinant granulocyte colony-stimulating factor based synthetic receptor binding with genetically engineered dimeric analyte derivatives. <i>Biosensors and Bioelectronics</i> 2020, 156, 112112.</p> <p>S. Ramanavicius, A. Jagminas, A. Ramanavicius, Advances in molecularly imprinted polymers based affinity sensors (Review). <i>Polymers</i> 2021, 13, 974.</p> <p>Z. Balevicius, J. Talbot, L. Tamosaitis, I. Plikusiene, A. Stirke, G. Mickiene, S. Balevicius, A. Paulauskas, A. Ramanavicius. Modelling of immunosensor response: the evaluation of binding kinetics between an immobilized receptor and structurally-different genetically engineered ligands. <i>Sensors and Actuators B Chemical</i> 2019, 297, 126770.</p>
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Certified during Doctoral Committee session on September 28th, 2021. Protocol No. 610000-KT-142.

Committee Chairman prof. habil. dr. Aivaras Kareiva