PhD STUDIES COURSE UNIT DESCRIPTION

Name of subject	Field of science, code	Faculty / Center	Department
Electrochemistry of coordinative compounds	Chemistry N 003P	Faculty of Chemistry and Geosciences, FTMC	Physical chemistry
Student's workload	**Credits**	**Student's workload**	**Credits**
Lectures		Consultations	3
Independent study	7	Seminars	

Course annotation
Equilibrium characteristics of complex compounds. Distribution of complexes and ligands in solutions. Material balance equations. Systems with protonated forms of ligands. Regularities of mass transport of labile complexes. Two diffusion layer models. Fik's laws I and II. Distribution of components in the diffusion layer and its calculation methods. Peculiarities of stationary voltammetric characteristics in complex systems, cathodic subwaves and anodic limit currents. Characteristics of non-stationary processes. Methods of kinetics and mechanism research of electrode processes: corrected Tafel line method, methods of maintaining constant surface concentration, method of isopotential solutions, method of determination of exchange current density under forced convection conditions. Overview of experimental data of real processes. Cyanide Ag (I), Cu (I), Au (I) and Cd (II) systems. Cu / Cu (II) system, glycine. Peculiarities of road metal deposition in complex systems.
Reading list
1. D. Plaušinaitis. Metalų kompleksinių junginių elektrochemija. Paskaitų konspektai. 3-ias leidimas, VU, Chemijos fakultetas, Fizikinės chemijos katedra 2010. 2. J.O'M Bockris, A.K.N.Reddy. Modern Electrochemistry. Plenum Press, New York, 1998. 3. A.J.Bard., L.R.Faulkner. Electrochemical methods Fundamentals and applications. John Wiley & sons, inc. 2001. 4. V.I.Kravcov. Ravnovesije i kinetika elektrodnych reakcij kompleksov metalov. Leningrad: Chimija, 1985. –208p. (rusų k.). 5. A.Survila. Elektrodiniai procesai metalo labiliojo komplekso sistemose. Vilnius: Mokslas. 1989. – 141p. (rusų k.).

The names of consulting teachers	**Science degree**	**Main scientific works published in a scientific field in last 5 year period**
Deivis Plaušinaitis	Dr.	1. D. Plausinaitis, L. Sinkevicius, U. Samukaite-Bubniene, V. Ratautaite, A. Ramanavicius, „Evaluation of electrochemical quartz crystal microbalance based sensor modified by uric acid-imprinted polypyrrole“, *Talanta*, 2020, 121414, DOI: 10.1016/j.talanta.2020.121414 2. D. Plausinaitis, D. Balciunas, A. Ramanavicius, „Synthesis of Heterogeneously Conductive Polypyrrole Layer from Non-Aqueous Solution Using The Double-Step Potential Technique“, *Journal of the Electrochemical Society*, 2020, 167, DOI: 10.1149/1945-7111/ab918a 3. D. Plausinaitis, A. Prokopchik, A. Karaliunas, L. Bogdan, Y. Balashevska, “Erbium Concentration Anomalies as an Indicator of Nuclear Activity: Focus on Natural Waters in the Chernobyl Exclusion Zone”, *Science of the Total Environment*, 2018, 621, 1626-1632 D. Plausinaitis, L. Sinkevicius, L. Mikoliunaite, V. Plausinaitiene, A. Ramanaviciene, A. Ramanavicius, „Electrochemical polypyrrole formation from pyrrole 'adlayer'“, *Physical Chemistry Chemical Physics*, 2017, 19, 1029-1038

Arūnas Ramanavičius	Habil. dr.	1. J. Dronina, U. Bubniene, A. Ramanavicius, „The application of DNA polymerases and Cas9 as representative of DNA-modifying enzymes group in DNA sensor design (review)“ , *BIOSENSORS & BIOELECTRONICS*, 2021, 175, DOI: 10.1016/j.bios.2020.112867 2. J. Petroniene, I. Morkvenaite-Vilkonciene, R. Miksiunas, D. Bironaite, A. Ramanaviciene, K. Rucinskas, V. Janusauskas, A. Ramanavicius. „Scanning electrochemical microscopy for the investigation of redox potential of human myocardium-derived mesenchymal stem cells grown at 2D and 3D conditions“, 2020, DOI: 10.1016/j.electacta.2020.136956 3. D. Plausinaitis, L. Sinkevicius, U. Samukaite-Bubniene, V. Ratautaite, A. Ramanavicius, „Evaluation of electrochemical quartz crystal microbalance based sensor modified by uric acid-imprinted polypyrrole“, *Talanta*, 2020, 121414, DOI: 10.1016/j.talanta.2020.121414 4. D. Plausinaitis, D. Balciunas, A. Ramanavicius, „Synthesis of Heterogeneously Conductive Polypyrrole Layer from Non-Aqueous Solution Using The Double-Step Potential Technique“, *Journal of the Electrochemical Society*, 2020, 167, DOI: 10.1149/1945-7111/ab918a
Henrikas Cesiulis	Dr.	1 . R. Levinas, N. Tsyntsaru, H. Cesiulis, „Insights into electrodeposition and catalytic activity of MoS2 for hydrogen evolution reaction electrocatalysis“, *ELECTROCHIMICA ACTA*, 2019, 317, 427-436 2. E. Vernickaite, N. Tsyntsaru, K. Sobczak, H. Cesiulis. „Electrodeposited tungsten-rich Ni-W, Co-W and Fe-W cathodes for efficient hydrogen evolution in alkaline medium“, *ELECTROCHIMICA ACTA*, 2019, 318, 597-606 3. A. Nicolenco, N. Tsyntsaru, J. Fornell, E. Pellicer, J. Reklaitis, D. Baltrunas, H. Cesiulis, J. Sort, „Mapping of magnetic and mechanical properties of Fe-W alloys electrodeposited from Fe(III)-based glycolate-citrate bath“, *MATERIALS & DESIGN*, 2018, 139 P, 429-438 4. A. Nicolenco, N. Tsyntsaru, H. Cesiulis. „Fe (III)-Based Ammonia-Free Bath for Electrodeposition of Fe-W Alloys“, J*OURNAL OF THE ELECTROCHEMICAL SOCIETY*, 2017, 164 Issue: 9, D590-D596

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Committee Chairman prof. habil. dr. Aivaras Kareiva