

Surface electrochemistry of semiconductors and polymers research group



HEAD:

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GROUP MEMBERS:

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RESEARCH PROFILE:

The scientific interest of the group is focused on three fields of research. The studies of physico-chemical processes and material science tied with electrodeposition of semiconductive materials, deposition of polyelectrolytes and calculation of thermodynamic properties of halogenated hydrocarbons in IUPAC-NIST standard.

We apply electrochemical methods for direct deposition of semiconductor electrodes. The goal is to optimize deposition processes to obtain an easy and cheap method for the production of materials applied in photo-electrochemical processes (water splitting, photocatalysis). In the case of deposition of polyelectrolytes we endeavor to the preparation of layers that will exhibit proper permeability properties for the application of these materials for encapsulation of biological cells. The goal is also to use these systems as scaffolds for hybrid organic-inorganic composites.

CURRENT RESEARCH ACTIVITIES:

1. Electrodeposition of SiO_x based electrodes for photoelectrochemical application
2. Electrodeposition of CdSe, Se based electrodes for photoelectrochemical application
3. Calculation of solubility of halogenated hydrocarbons in IUPAC-NIST standard
4. Preparation of polyelectrolytes multilayers (PEM) systems, studies focused on composition-properties dependencies
5. Structural interaction studies in PEM systems
6. Application of PEM as scaffolds for inorganic nanostructures.

SELECTED PUBLICATIONS:

1. B. Czerwieniec, M. Strawski, L.H. Granicka, M. Szklarczyk, AFM study of adhesion and interactions between polyelectrolyte bilayers assembly, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*. 555 (2018) 465-472.
2. M. Strawski, L.H. Granicka, M. Szklarczyk, Redox properties of polyelectrolyte multilayer modified electrodes: a significant effect of the interactions between the polyelectrolyte layers in the films, *Electrochimica Acta*. 226 (2017) 121-131.
3. A. Krywko-Cendrowska, L. Marot, L. Philippe, M. Strawski, E. Meyer, M. Szklarczyk, Spectroscopic characterization and photoactivity of SiO_x-based films electrochemically grown on Cu surfaces, *Journal of Applied Electrochemistry*. 47 (2017) 917-930.
4. P. Oracz, M. Góral, B. Wiśniewska-Goćłowska, D.G. Shaw, A. Mączyński, IUPAC-NIST Solubility Data Series. 101. Alcohols + Hydrocarbons + Water. Part 2. C1-C3 Alcohols + Aliphatic Hydrocarbons, *Journal of Physical and Chemical Reference Data*. 45 (2016) 033102.
5. B. Maranowski, M. Strawski, W. Osowiecki, M. Szklarczyk, Study of selenium electrodeposition at gold electrode by voltammetric and rotating disc electrode techniques, *Journal of Electroanalytical Chemistry*. 752 (2015) 54-59.
6. A. Krywko-Cendrowska, M. Strawski, M. Szklarczyk, Low temperature electrodeposition of SiO_x films photoactive in water solution, *Electrochimica Acta*. 108 (2013) 112-117.