Course title: Electrocatalysis – selectable / regular course
Number of contact hours: 15 hours (15h lectures/seminar)

ETCS credits: 1

Course description: The course aims at a comprehensive understanding of the electrocatalysis in modern technology. Specific goals include gaining an understanding: electrochemistry basics; basic methods of catalysts preparation and modification for electrocatalysis; elementary steps in electrocatalysis; theoretical modeling in electrocatalyst design; the reaction mechanism during the electrochemical processes; role of nanoparticles in electrocatalysis; electrocatalysis of organic components in liquid phase; electrocatalysis of methanol and propanol; fuel cells technology; role of electrocatalysis in industrial applications. Modern trends in electrocatalysis for future energy saving technology will be presented, including basics of batteries construction, hydrogen production, hydrogen cycling by enzymes.

Education effects (P7S_UW, P7S_WG)**:**

- **knowledge**: student is able to predict the possible products and intermediates during the electrocatalytic processes; able to explain the different types of redox reaction mechanisms; able to choose and describe materials and processes for the electrocatalytic processes; have a basic knowledge about electrocatalysts and its possible application during the industrial processes

- **skills**: student is able to describe and explain : - the basic concepts in electrocatalysis; - basic steps and reaction mechanism in electrocatalytic processes; - basic problems in electrocatalytic cells construction and design

- **social**: student has a knowledge about the applications of electrocatalysis

Literature: [1] Minhua Shao — Electrocatalysis in Fuel Cells, London, 2013, Springer-Verlag; [2] Jacek Lipkowski — Electrocatalysis: Theoretical Foundations and Model Experiments, New York, 1998, Wiley; [3] Elizabeth Santos — Catalysis in Electrochemistry: From Fundamental Aspects to Strategies for Fuel Cell Development, New York, 2011, Wiley

Assessment method: Final test, seminar presentation

Prerequisites: Basic knowledge in physical chemistry

Primary target group: All specialties students

Lecturer: dr hab. inż. I. Czekaj, Contact person: dr hab. inż. I. Czekaj e-mail: iczekaj@chemia.pk.edu.pl