

COURSE DESCRIPTION

Subject: Ogniwa paliwowe/Fuel cells

Duration: 1 semester (2W, 2C)

Field and type studies: Environmental Engineering

Language: English

Teacher: Renata Włodarczyk, PhD., Eng.

Course objectives: A fuel cell is a low-voltage current source, wherein a result of electrochemical oxidation of fuel produces a continuous current. Allows direct electrochemical oxidation and convenient conversion of chemical energy of fuel, without the need for combustion of the material and then further transforming into heat.

In the context of this subject are the different types of primary cells, cell efficiency, the impact of the basic parameters of the operation of the fuel cell. An important issue is the design of the cells and, therefore, will be discussed functions of the individual elements, choice of materials and technology for the manufacture of the components. It is essential in a fuel cell has a problem of classification of cell types and in terms of, inter alia: the power method, and the area of use, type of electrolyte, temperature, mode of fuel delivery. The fuel for the fuel cell and hydrogen gas mixtures and liquid, which contain large amounts of hydrogen (hydrocarbons, alcohols). The discussion will also be subject to the jurisdiction of the area in hydrogen production methods, and how to store hydrogen. Due to the changing condition of the area of fuel cell technology, will also be moved aspect of the development and commercialization prospects of the world and Poland.

Schedule of lectures

No.	Topics	Number of hours
1.	Cells I and II type	2
2.	Genesis of the development of fuel cells. Efficiency of fuel cell.	2
3.	Construction of fuel cells, function of elements of fuel cells	2
4.	Selection of materials for electrodes, electrolytes.	2
5.	Principle of fuel cells. Types of fuel cells. Classification of fuel cells.	2
6.	Thermodynamics in fuel cells. Electrochemical analysis of fuel cells.	2
7.	Auxiliary devices needed for fuel cell.	2
8.	Fuel cells as generators for residential.	2
9.	Fuel cells as drive vehicles.	2
10.	Fuel cells for military, emergency systems.	2
11.	Fuels for fuel cells. Reforming process.	2
12.	Properties of hydrogen as energy carrier.	2
13.	Methods of obtaining hydrogen and storage of hydrogen.	2
14.	Economic analysis of the production and use of fuel cells.	2
15.	Global and domestic market of fuel cells.	2

Schedule of auditorium meeting

No.	Topics	Number of hours
1.	Introduction to the subject	2
2.	Redox reaction. Voltage range of metals.	2
3.	Cells of I type – reactions, standard potential.	2
4.	References electrodes.	2

5.	Cells of II type – reactions, standard potential.	2
6.	Test.	2
7.	Operating characteristics of fuel cells. Efficiency of fuel cells.	2
8.	Carbon in fuel cells. Kind of carbon for elements in fuel cells.	2
9.	Types of catalysts used in fuel cells.	2
10. /11	Analysis of the choice of materials for elements of fuel cells I- measurement methods, properties.	4
12./ 13.	Analysis of the choice of materials for elements of fuel cells II- porosity, microstructure, wettability, contact resistance, corrosion resistance.	4
14.	Test.	2
15.	Summary, discussion.	2