GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00065833		
Field of study	Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Ceramics -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Tadeusz Miruszewski	
	Teachers	dr hab. inż. Sebastian Wachowski dr inż. Tadeusz Miruszewski	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	3.0	17.0	50

Subject objectives

Acquiring knowledge about the phenomena, technologies and applications of electroceramics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] Has extended knowledge of the fields of science and scientific disciplines relevant to materials engineering, and their historical development and importance for the progress of exact and natural sciences, knowledge of the world and evolution of humanity.	Understands the need to update knowledge regarding materials	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K7_U06] Can evaluate usefulness and feasibility of using new achievements (techniques and technologies) within the scope of materials science.	The student has knowledge of the design and research of new ceramic materials.	[SU4] Assessment of ability to use methods and tools
[K7_W03] Has extended and enhanced knowledge of mathematics, physics, chemistry and other fields, useful when formulating and solving problems within the scope of materials science.	The student has extended and in-depth knowledge of the physicochemical phenomena occurring in electroceramics.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

1. Introduction, definition of electroceramics, historical outline, selected technological issues of ceramic production; differences between ceramics and electroceramics.2. Methods of producing ceramic powders; methods of densifying ceramics, methods of producing porous ceramics; methods of forming ceramic elements;3. Ionic conducting electroceramics: point defects, Kroger-Vink notation; ionic diffusion and conductivity; doped ZrO_2 and other oxygen ion conductors; proton conductors; materials with mixed electronic-ionic conductivity;4. Methods of testing the electrical properties of electroceramics;5. Applications of electroceramics: gas sensors, membranes and electrochemical cells.

Prerequisites and co-requisites

Knowledge of solid state physics and electrochemistry.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Lecture</td><td>50.0%</td><td>60.0%</td></tr>
<tr><td>Excercises</td><td>50.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">scientific literature andA. J. Moulson, J. M. Herbert, Electroceramics: Materials, Properties, Applications, Copyright © 2003 John Wiley & Sons, Ltd</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">none</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Basic
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44886 - eLearining course</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">-defects in ionic crystals-diffusion mechanisms-Kroger-Vink notation-types of fuel cells-defect equilibrium diagrams</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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