

SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

Subject card

Subject name and code	Nanostructures in glasses and amorphous materials, PG_00031637								
Field of study	Nanotechnology								
Date of commencement of studies	October 2020		Academic year of realisation of subject			2022/2023			
Education level	first-cycle studies		Subject group						
Mode of study	Full-time studies		Mode of delivery			at the university			
Year of study	3		Language of instruction			Polish			
Semester of study	6		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Zakład fizyki nanomateriałów -> Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics								
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Leszek Wicikowski						
	Teachers dr inż. Leszek Wicikowski								
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	30.0	0.0	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		0.0		0.0		30	
Subject objectives	The main aim is to present the fundamental knowledge and achievements in preparation of different nanostructures in glasses and amprphous materials and also to indicate their application in materials technology.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	к6_U06		The student can provide methods of producing nanostructures in amorphous materials using the knowledge of physics, chemistry and material engineering			[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task			
	K6_W07		The student knows the importance of nanostructures in defining the properties of materials. Can identify research tools for their characterization.			[SW3] Assessment of knowledge contained in written work and projects			
Subject contents	Glassy state of matter. Glass transition. Glass formation criteria. Short range order. Phase separation. Processes of crystallization and nano-crystallization. Classification of inorganic oxide glasses. Special glasses: chalcogenide and metallic glasses. Preparation of glasses and amorphous materials. Aerogels and sol-gel films. Physical properties of glasses. Amorphous semiconductors (amorphous silicon, mobility gap, defects). Optical and electrical properties of glasses containing metallic and semiconducting nanostructures. Optical nonlinearity in glasses. Application of amorphous materials in electronics and opto-electronics.								
Prerequisites and co-requisites	Fundamental knowledge in solid state physics and quantum physics								
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade			
	Final colloquium		50.0%			67.0%			
	Essay		100.0%			33.0%			

Recommended reading	Basic literature	1. R. Zallen, The physics of amorphous solids, Wiley NY, 1983					
		2. Fuxi Gan and Lei Xu, Photonic Glasses, World Scientific, 2006					
		3. S.R. Elliott, Physics of amorphous materials, Wiley, 1990					
		4. J. Zarzycki, Glasses and the vitreous state, Cambridge University Press, 1991					
		5. Arun K. Varshneya, Fundamentals of Inorganic Glasses					
	Supplementary literature	Scientific publications concerning topics of seminars					
	eResources addresses	Adresy na platformie eNauczanie:					
Example issues/ example questions/ tasks being completed	Glassy state of matter. Glass transition. Glass formation criteria. Short range order. Phase separation. Processes of crystallization and nano-crystallization. Classification of inorganic oxide glasses. Special glasses: chalcogenide and metallic glasses. Preparation of glasses and amorphous materials. Aerogels and sol-gel films. Ionic and electronic conductivity in glasses. Thermal properties of glasses and aerogels. Electrical properties of amorphous semiconductors (amorphous silicon, mobility gap, defects). Optical and electrical properties of glasses containing metallic and semiconducting nanostructures. Optical nonlinearity in glasses.						
Work placement	Not applicable						