

2 up. 
Prof. dr hab. inż. Stanisław Cudziło

Nazwa przedmiotu: **Synthesis of liquid crystals**
(synteza ciekłych kryształów)
Nazwa w jęz. angielskim: **Synthesis of liquid crystals**
Kod przedmiotu: WTCCXCSM- SLC

Dane dotyczące przedmiotu:
Jednostka oferująca przedmiot: Wydział Nowych Technologii i Chemii
Przedmiot dla jednostki: Wydział Nowych Technologii i Chemii
Obowiązuje od naboru marzec 2016

Domyślny typ protokołu dla przedmiotu:		
Zaliczenie na ocenę		
Język wykładowy:		
angielski (domyślnie) lub opcjonalnie polski		
Skrócony opis:		
Introduction to the field of liquid crystals its main present applications. Introduction to correlations between molecular structure and liquid crystalline properties with special attention to the field of fluorinated organic materials. Short survey over main generations of liquid crystals and main classes of intermediates, their importance and synthesis.		
Opis:		
Introduction. Liquid Crystals (LCs). Classes of liquid crystals their structures and properties. Anisotropic properties of liquid crystals Applications of LCs. The principles of display's operations. LCD switching modes. Direct View Displays. Projection microdisplays. Reflective vs transmissive microdisplays. Non display applications. Properties of LCs related to LCD technologies Determination of LC phases. Liquid Crystals textures. Polarizing thermomicroscopic measurements. Miscibility study. Phase diagrams. Microcalorimetric measurements. X-ray measurements. Electrooptic and dielectric phase characterization. Liquid Crystals mixtures. Phase transitions, thermodynamics of binary mixtures, ideal mixtures, non additive behavior, CSL equations, LC mixtures formulations Fluorinated LCs. Carbon-Fluorine bond character. Comparison of fluorinated organic materials with non-fluorinated ones. Fluorinated LCs. Sources of fluorinated intermediates and their synthesis. Survey of fluorination methods. Synthesis of Liquid Crystals. Synthesis of main classes of LCs. Synthesis of main intermediates. Designing of synthetic routes of some chosen mesogens. Purification and analytical methods. Synthesis of chiral LC materials. Laboratory classes of Liquid Crystals synthesis. Safety precautions. Multistep synthesis of one compounds from two group of nematic LCs. Characterization of Liquid Crystal phases of obtained product		
Literatura:		
Podstawowa: Sivaramakrishna Chandrasekhar "Liquid crystals" Cambridge University Press 1977 Dietrich Demus "Physical properties of liquid crystals" John Wiley & Sons 2009 Peter J. Collings "Introduction to Liquid Crystals: Chemistry and Physics" Taylor & Francis 1997 Uzupełniająca: Set of original papers from the synthesis methods used in synthesis of Liquid Crystals.		
Efekty kształcenia:		
Numer	Opis	Odniesienie do efektów kierunkowych
W1	To know the fundamentals of liquid crystals and the relation between the molecular structure and the properties.	K_W04, K_W11
W2	To know the way of designing the multistep organic synthesis	K_W05, K_W06
W3	To know the relations between molecular structure and IR, 1H NMR, UV-VIS, MS spectrums.	K_W12
W4	To know the basic organic synthesis methods and techniques and the names of the most common labware and glassware.	K_W06
U1	Is able using gathered knowledge, propose methods of synthesis of simple organic compounds.	K_U03
U2	Is able to predict and analyse main side reactions usually present along with main organic reactions.	K_U05
U3	Is able to design multistep synthesis and propose the synthesis conditions using available literature and other sources of scientific knowledge.	K_U03, K_U10, K_U11
U4	Is able to set the organic reaction and purification systems using common labware and glassware.	K_U03

K1	Is aware of the level of own knowledge and is able to self-containedly correct the directions of the self-education.	K_K01, K_K06
K2	Is able actively and responsibly cooperate in the given group during solving theoretical as well as practical tasks.	K_K02 K_K03
K3	Is aware of the importance of the organic chemistry and materials chemistry in science and current society.	K_K05

Metody i kryteria oceniania:

The subject is accepted basing on the positive result of examination procedure.

The examination form: written + oral: the solution three chosen problems of the following topics: organic synthesis of LCs, molecular design and LC properties correlations - which are given as a set of problems during the semester.

Mark 5 - three comprehensive answers

Mark 4.5 - two comprehensive answers and one middling answer

Mark 4 - one comprehensive answer and two middling answers or two comprehensive answers

Mark 3.5 three middling answers or one comprehensive answer and one middling answer

Mark 3 - two middling answers

The needful requirement is written laboratory report from the organic synthesis labs according given template.

Effects W1, W2, U1, U2, U3, K1, K3 are evaluated during examination.

Effects W3, W4, U1, U4, K2 are evaluated during organic synthesis labs.

Praktyki zawodowe:

brak

Forma studiów

stacjonarne

Rodzaj studiów

II stopnia

Rodzaj przedmiotu

wybieralny

Przedmioty wprowadzające

- Basic general chemistry course
Initial requirements: the knowledge of principles of chemistry, basic correlations of chemical structure with its physicochemical properties, basic knowledge of quantum chemistry and classical thermodynamics
- Basic physics course
Initial requirements: basic knowledge of principles of optics and electromagnetism and electrical properties of materials
- Basic organic chemistry course
Initial requirements: basic knowledge related to first (BSc or equivalent) level of organic chemistry
- Basic preparative chemistry laboratories
Initial requirements: basic skills in setting up the conventional reaction glass systems, basic skills in reaction work-up and purification of organic compounds

Programy

kierunek: Chemia

specjalność: wszystkie specjalności

Forma zajęć liczba godzin/rygor

semestr	x- egzamin, + zaliczenie, # projekt						ECTS
	razem	wykłady	ćwiczenia	laboratoria	projekt	seminarium	
III	30	14/ +		16 / +			2

Autor

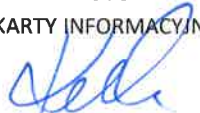
Ppłk dr hab. inż. Przemysław KULA

Bilans ECTS

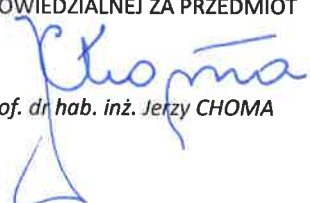
Lp.	Aktywność	Obciążenie w godz.
1	Udział w wykładach	14
2	Samodzielne studiowanie tematyki wykładów	14
3	Udział w ćwiczeniach	
4	Samodzielne przygotowanie się do ćwiczeń	
5	Udział w laboratoriach	16
6	Samodzielne przygotowanie się do laboratoriów	14
7	Udział w seminariach	
8	Samodzielne przygotowanie się do seminariów	

9	Realizacja projektu		
10	Udział w konsultacjach	2	
11	Przygotowanie do egzaminu		
12	Udział w egzaminie		
		Godz.	ECTS
Sumaryczne obciążenie pracą studenta		60	2
Zajęcia z udziałem nauczycieli: 1+3+5+7+9+10+12		32	1
Zajęcia o charakterze praktycznym: 5+6+9		30	1
Zajęcia powiązane z działalnością naukową: 1+2+3+4+7+8		28	1

AUTOR
KARTY INFORMACYJNEJ


Ppłk dr hab. inż. Przemysław KULA

KIEROWNIK JEDNOSTKI ORGANIZACYJNEJ
ODPOWIEDZIALNEJ ZA PRZEDMIOT


Prof. dr hab. inż. Jerzy CHOMA