Study Programme: Physics

Course Unit Title: Introduction to Properties of Luminescent Materials

Course Unit Code: M24ULM

Name of Lecturer(s): Dr. Tamara Ivetić

Type and Level of Studies: Master Academic Studies Physics

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 8

Prerequisites: None

Course Aims:

This course aims to teach students the basic properties, classifications, synthesis, and applications of inorganic luminescent materials.

Learning Outcomes:

Students should develop:

- General abilities: Students will get to know the properties, synthesis technology and application of inorganic luminescent materials; how to follow professional literature; write and present a seminar paper.
- Course-specific abilities: Students will be able to design and perform synthesis and characterization experiments of luminescent materials.

Syllabus:

Theory

Luminescence (photoluminescence, radiative transition lifetime, photoluminescence efficiency, upconversion). Photoluminescence of inorganic materials doped with rare earth and transition metal ions. Methods of synthesis of luminescent materials (sol-gel, combustion method, mechanochemical method with solid phase reactions). Photoluminescence spectroscopy (excitation and emission spectra, measurement of the lifetime of a radiative transition, temperature measurement based on photoluminescence). Application of photoluminescent inorganic materials.

Practice

Experimental research work, preparation and presentation of a seminar paper.

Required Reading:

1. „Phosphors handbook 2nd edition", W.M. Yen, S. Shionoya, H. Yamamoto, (Eds.), CRC Press, Taylor & Francis Group, New York, 2007.

2. M. Graft, R. Reisfeld, G. Panczer, Modern luminescence spectroscopy of minerals and materials, Second edition, Springer Internation Publishing, Switzerland, 2015.

3. E.G. Yukihara, S.W.S. McKeever, Optically stimulated luminescence, Fundamentals and applications, John Wiley & Sons Ltd, West Sussex, UK, 2011.

4. Advances in physics and applications of optically and thermally stimulated luminescence, R. Chen, V. Pagonis, (Eds.), World Scientific Publishing Europe Ltd. London, UK, 2019.

Weekly Contact Hours:	**Lectures:** 3	**Practical work:** 2

Teaching Methods: Lectures and laboratory exercises.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation	5	written exam	
Practical work	10	oral exam	70
Preliminary exam(s)			
Seminar(s)	15		