

105 學年第 2 學期 放光光譜學 Luminescence spectroscopy 課程綱要

課程名稱：（中文）放光光譜學		開課單位	分子碩			
（英文）Luminescence spectroscopy		永久課號	IMO5134			
授課教師：太田信廣						
學分數	3	必/選修	選修	開課年級	*	
先修科目或先備能力：						
Interest in luminescence study is the most important thing required for this class, but it is desirable for the students to have completed the Physical Chemistry course.						
課程概述與目標：						
Detection of luminescence including photoluminescence, electroluminescence, chemiluminescence and bioluminescence plays a significant role in basic and applied sciences of the fields of molecular, material, environmental, biological, pharmaceutical and medical sciences. Spectral measurements and time-resolved and space-resolved imaging measurements have been going on in every nook and cranny all over the world in various materials including biological systems. In order to understand the reported results correctly and to apply these methods properly in each field, the understanding both of the principles of the luminescence and of the experimental procedures is essential. In this class, I would like to introduce the fundamental aspects of luminescence spectroscopy as well as some experimental results in the fields of chemistry, physics and biology. I would like to guide students to understand and think what kind information can be obtained by using luminescence spectroscopy.						
教科書（請註明書名、作者、出版社、出版年等資訊）	No text book will be used in this course. (References) Principles of Fluorescence Spectroscopy (2006, J. R. Lakowicz, Springer), Molecular Fluorescence spectroscopy (2013, B. Valeur, M. N. Berberan-Santos, Wiley-VCH), 発光之事典（2016、木下、太田、南、永井，編、朝倉書店、if you are interested in Japanese）					
課程大綱		分配時數				備註
單元主題	內容綱要	講授	示範	習作	其他	
教學要點概述：						
1.學期作業、考試、評量 Daily performance in the class 50 %, and other 50% are marked by examination/reports. In the class, I will ask questions to the students, and reports are required occasionally. A minimum knowledge is important, and more important thing is to consider the way to solve the problem. From these points of view, the score will be decided.						

2.教學方法及教學相關配合事項(如助教、網站或圖書及資料庫等)

Drs. Kamlesh Awasthi and Morihiko Hamada will help Lab experiments.

師生晤談	排定時間	地點	連絡方式
	You are invited to visit my room between 15:00-16:00. It is recommended to send a mail before you visit the room.	Room 430A of Science Building II.	Ext: 31395 mail: nohta@nctu.edu.tw

每週進度表

週次	上課日期	課程進度、內容、主題
1	2/16	Introduction of luminescence (spectrum, intensity, quantum yield, lifetime, polarization, and correction of measured spectra)
2	2/23	Interaction between particle and radiation field
3	3/2	Molecular energy level, absorption and emission
4	3/9	Molecular structure, transition moment and polarization
5	3/16	Relation between emission properties and environments, and fluorescence sensing
6	3/23	Intra- and intermolecular relaxation and photoluminescence
7	3/30	Radiative decay process and nonradiative decay process
8	4/6	Luminescence of excimer and exciplex
9	4/13	Luminescence probes (for pH, viscosity, temperature, polarity)
10	4/20	Midterm examination
11	4/27	Biological fluorophores (fluorescent protein, autofluorescence chromophores)
12	5/4	Photoexcitation energy transfer (theory)
13	5/11	Photoexcitation energy transfer (experiments)
14	5/18	Effects of electric field and magnetic field on photoluminescence
15	5/25	Emission imaging of intensity and polarization and single molecule detection
16	6/1	Fluorescence lifetime imaging
17	6/8	Fluorescence correlation and multiphoton excitation and High-resolution imaging
18	6/15	Term-end exam

※ 請同學遵守智慧財產權觀念及勿使用不法影印教科書。

備註：

1. 其他欄包含參訪、專題演講等活動。
2. 請同學遵守智慧財產權觀念及勿使用不法影印教科書。

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