INSD Summer School 2022, Osaka-Tsukuba
(Summer Lectures in 2022 on Nanotechnology/Nanoscience)

Two lectures : Live-hybrid (on site and on line) and other two lectures : On-demand

Open during July 19th and August 9th

Live final test (student presentation) at the end

Let's participate in the original graduate-level lectures on nano-science and nano-engineering given by lecturers from top foreign universities!

The R^3 Institute for Newly-Emerging Science Design, Osaka University will hold the INSD Summer School 2022 on Nanoscience and Nanotechnology with the combination of live-hybrid and on-demand styles, since this year the relaxation of movement restrictions caused by the COVID-19 allows us to invite one foreign lecturers abroad to Osaka. The Summer School 2022 is composed of two topics of live lectures and other two topics of on-demand lectures that are chosen from our archives recorded in 2018 and 2019. Each set of lectures of seven or eight times will be given during July 19th and August 9th. For on-demand style lectures, participating students should finish to view a series of lectures during the specified period and each time soon after viewing each lecture, send their answer to the short question for the evidence of viewing. All the final tests of student presentation will be given as live-hybrid style with the participation of the lecturers abroad. The ZOOM or Webex system will be used for the final presentation.
The summer school is aimed at fostering international young talent on nanoscience and nanoengineering. This program is shared with the University of Tsukuba by connecting these university students. The lecture documents and recorded lectures will be uploaded on URL: http://www.insd.osaka-u.ac.jp/nano/.

■**Lecturers:** This year the following lecturers will offer four topics, two from Osaka and two from Tsukuba.
Osaka University: Prof. Masashi Watanabe (Dept. Mater. Sci. & Eng., Lehigh University, USA),
Prof. Marie D'angelo (Institute for NanoSciences of Paris, Sorbonne University, France)
University of Tsukuba: Prof. Etienne Gheeraert & Prof. Henri Mariette (Universite Grenoble Aples, France)
Prof. Venkatesha Rama Hathwar (Goa University, India)
*Schedule and abstracts of lectures are shown on the second page.

■**Lecture Room:** (Toyonaka Campus, capacity: 20) R.N. 305, INSD Seminar Room, 3rd floor of Interdisciplinary Research Building.

■**Applicants:** Although the priority is given to graduate-school students who take "Graduate Minor Program or Graduate Program for Advanced Interdisciplinary Studies for Education, Research and Training on Nanoscience and Nanotechnology" (hereafter, nano-program), "Interactive Material Science Cadet Program", "Multidisciplinary PhD Program for Quantum Beam", and "Honors Program in Science, Engineering and Informatics", there is plenty of room for other domestic and foreign graduate and undergraduate students and staff members to be welcome. Homework exercises and final test (student presentation) will be imposed on graduate students who desire credits. They are also requested to reply to short questions in case of on-demand lectures for the evidence of the viewing.

■**Maximum number of topics and units of credit:** One unit of credit for "International Exchange Lecture on Nano-science and Nano-engineering B or C" is given to graduate students who complete a series of lectures on one topic. Graduate students can get up to two units of credit. Especially, foreign students desiring to take the nano- program, but being not good at Japanese, are requested to complete these two topics in order to transfer two units of credit to the otherwise required module, "Nanotechnology Career-up Lectures for Social, Legal, Ethical Relationship".

■**Deadline and method of application:** Deadline depends on the lecturers. Send the following information either in Japanese or in English to the INSD staff who is in charge. E-mail address: nano-program@insd.osaka-u.ac.jp

Registration deadline: Prof. Watanabe and Prof. D'angelo: Thursday, July 14th

Registration deadline: Prof. Gheeraert & Prof. Mariette and Prof. Hathwar: Tuesday, July 19th

Full name, student registration code, affiliation (graduate school/school, department, D/M/B, school year, affiliated research laboratory), E-mail address, specify whether one takes nanoprogram or not, chosen lecturer's name(s). You will receive the information how to access to the website for the lecture documents and recorded lectures.

■Lecture Schedule (about 94 minutes per lecture)

	Prof. Masashi Watanabe	Live-hybrid (on site and on line)	Lecture from Osaka
	Prof. Marie D' angelo	On-demand & Oral Exam (on-line)	
	Prof. E. Gheeraert Prof. H. Mariette	Live-hybrid (on site and on line)	Lecture from Tsukuba
	Prof. V.R. Hathwar	On-demand & Oral Exam (on-line)	

Time/Date	7/19	7/20	7/21	7/22	7/25	7/26	7/27	7/28	7/29	8/1	8/2	8/3	8/4	8/5	8/8
9:00-10:34						OFF									
10:45-12:19	1			6	Oral Exam										
13:30-15:04	2		5	7			1	2	3	4	5	6	7	8	Oral Exam
15:15-16:49		3													
17:00-18:34		4													

Lecturer	7/19 (On-demand)	From July 19th to August 4th (On-demand Lectures) Reply to short question for the evidence of every viewing							Final Test Oral Exam (On-line)
Prof. Marie D' angelo	Guidance	1	2	3	4	5	6	7	August 5th 16:00~18:00
Lecturer		From July 20th to August 8th (On-demand Lectures) Reply to short question for the evidence of every viewing							Final Test Oral Exam (On-line)
Prof. V.R. Hathwar		1	2	3	4	5	6	7	August 9th 13:30~16:49

■Lecturers, and Titles and Abstracts of Lectures

Lectures from Osaka

Transmission Electron Microscopy -Fundamental Principle and Applications to Materials Science

Prof. Masashi Watanabe

(Dept. of Mater. Sci. & Eng., Lehigh University, USA)

- Basic concepts of TEM instrumentation
- Electron scattering and diffraction
- Image formation in TEM
- Analysis in TEM
- Advanced topics and applications of TEM

Introduction to Photoelectron Spectroscopy and Synchrotron Radiation

Prof. Marie D'angelo

(Institute for NanoSciences of Paris, Sorbonne University, France)

-Generalities & technical aspects of photoemission
-Interaction Hamiltonian & transition probability
-Transitions from localized states: core level photoemission
-Band dispersion: Angle-Resolved Photoemission
-X-ray production: comparison of X-ray tubes, synchrotron radiation and Free Electron Laser
-Basics and theory of synchrotron radiation
-New developments in photoemission: time-resolved and near ambient pressure photoemission

Lectures from Tsukuba

Semiconductors Physics and Engineering, Doping, Defect, Optical Properties

Prof. Henri Mariette and Prof. Etienne Gheeraert

(University of Grenoble-Alpes, France)

-Introduction to the various semiconductor materials and general concepts
-Semiconductor doping by diffusion
-Semiconductor doping by ion implantation
-Basic phenomena in semiconductor optics.
-Elementary electronic devices

X-ray Scattering and Electron Density Analysis: Methodology and Applications

Prof. Venkatesha Rama Hathwar

(Gao University, India)

-Symmetry
-X-ray diffraction
-Introduction to electron density study
-Experimental requirements
-Atoms in Molecules

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