科目ナンバリング	U-LAS70 10002 SE50						
授業科目名<英訳>	ILAS Seminar-E2 :How to make nano-machines（ナノマシンの作り方） ILAS Seminar-E2 :How to make nano-machines			担当者所属職名・氏名	非常勤講師 BANERJEE, Amit		
群	少人数群	単位数	2単位	週コマ数	1コマ	授業形態	ゼミナール（対面授業科目）
開講年度・開講期	2025・前期	受講定員(1回生定員)	15 (15) 人	配当学年	主として1回生	対象学生	全学向
曜時限	金5	教室	4共12			使用言語	英語
キーワード	Nano / Nano-machine / Nano-technology / Internet of Things (IoT) / Artificial Intelligence (AI)						

[授業の概要・目的]

Nanotechnology is revolutionizing human society. If you are curious how nano-machines are being developed, this seminar course will be very informative.

One of the greatest technological achievements of past few decades is our ability to make micro-meter scale ' machines'. These machines have become ubiquitous in our daily life, giving functional capabilities to our smart-phones, cars, digital projectors, medical devices, etc. In this technological revolution of extreme ' shrinking' of machines, we have entered an era where machines of only a few hundreds atoms wide can be built.

Have you ever wondered how do we build such small machines and make them function desirably in such small scale?

In this seminar course, I will reveal the tricks of the trade of fabricating micro / nanoscale machines. I will also elaborate the underlying physics (working principles) of micro / nano machines. This seminar course is based on my own research area, so I can show you pictures and videos of actual micro / nano machine fabrication and operation that I collect during my own research in Kyoto University.

[到達目標]

Students will learn about nano-scale machines: how they work, how they are made, and their amazing applications.

[授業計画と内容]

1. Why do we want to make nano-machines?
Introduction to nano-machines and their advantages, examples of micro/ Nano-machines and their applications. (2 weeks)

2.How can we controllably create and sense motion at nanoscale?
Building blocks of nano-machines: actuators, motion sensors, etc. (3 week)

3. How do nano-machines work?
Working principles of nano-machines: accelerometers, gyroscopes, pressure-sensors, ultra-sensitive mass and gas sensors, AI computing devices. (2 weeks)

4. How do we create nano-machines?
Material and methods for creating nano-machines: silicon, diamond, graphene, etc.; lithography, reactive-ion-

ILAS Seminar-E2 :How to make nano-machines（ナノマシンの作り方）(2)へ続く↓↓↓

etching, chemical-vapor-deposition, electron and ion-beam methods, etc. (5 weeks)

5. Discussion on current trends and future potentials of this research area. (2 weeks)

6. Feedback (1 week)

[履修要件]

特になし

[成績評価の方法・観点]

Active participation (10%), submission of a final report (topics will be discussed during the lecture) (90%)

[教科書]

使用しない

[参考書等]

（参考書）

Distribution of relevant materials (distributed by PandA, when necessary).

[授業外学修（予習・復習）等]

Following lecture materials and reading recommended articles

[その他（オフィスアワー等）]

To be decided during lecture

[主要授業科目（学部・学科名）]