

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	工学研究科 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	2024・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	共西03			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】							
<p>Nanotechnology is revolutionizing human society. If you are curious how nano-machines are being developed, this seminar course will be very informative.</p> <p>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.</p> <p>Have you ever wondered how do we build such small machines and make them function desirably in such small scale?</p> <p>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.</p>							
【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】							
<p>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)</p> <p>2.How can we controllably create and sense motion at nanoscale? Building blocks of nano-machines: actuators, motion sensors, etc. (3 week)</p> <p>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)</p> <p>4. How do we create nano-machines? <u>Material and methods for creating nano-machines: silicon, diamond, graphene, etc.; lithography, reactive-ion-</u></p>							
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】**

授業中に指示する

**【参考書等】**

(参考書)  
授業中に紹介する

**【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