

The achievements of  
cooperation of



with researchers and  
institutions **in the UK**

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**KANAZAWA**  
UNIVERSITY

**UK-Japan Higher Education Forum**  
8<sup>th</sup> December 2022

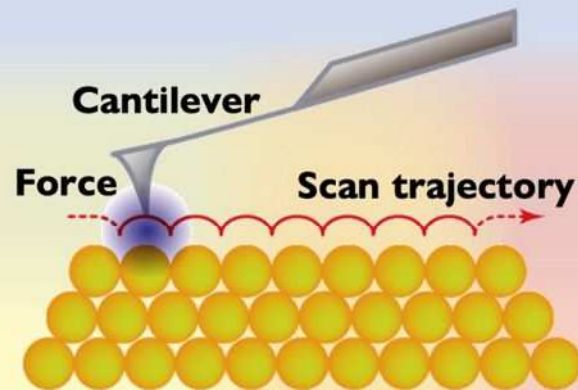
# What is Nano Life Sciences Institute (WPI-NanoLSI) ?

Inaugurated in **2017** as one of the research centres of the **WPI Program**, Japan's flagship research programme.

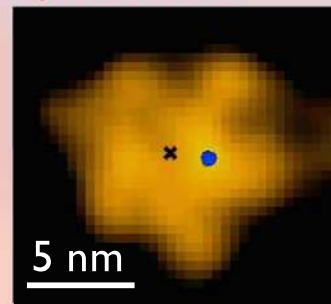
## Life Science

### Cancer Research

Research core: **Bio-Scanning Probe Microscopy (Bio-SPM)**



$F_1$ -ATPase



*Science (2011)*

Cellulase



*Science (2011)*

**Computation**

Simulation

**Nanometrology**

Bio-SPM

**Chemistry**

Supramolecule

**Aim to obtain a fundamental understanding of the mechanisms of complex life phenomena such as disease, senescence, and the emergence of life.**

# What is Nano Life Sciences Institute (WPI-NanoLSI) ?

## Life Science



Atsushi Hirao  
(PI)



Masanobu Oshima  
(PI)



Seiji Yano  
(PI)



Kunio Matsumoto  
(PI)



Rikinari Hanayama  
(PI)



Richard Wong  
(PI)



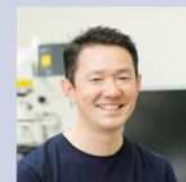
Miki Nakajima  
(PI)



Hanae Sato  
(Assoc. PI)



Satoshi Toda  
(Jr. PI)



Yusuke Miyanari  
(Jr. PI)

## Computational Science



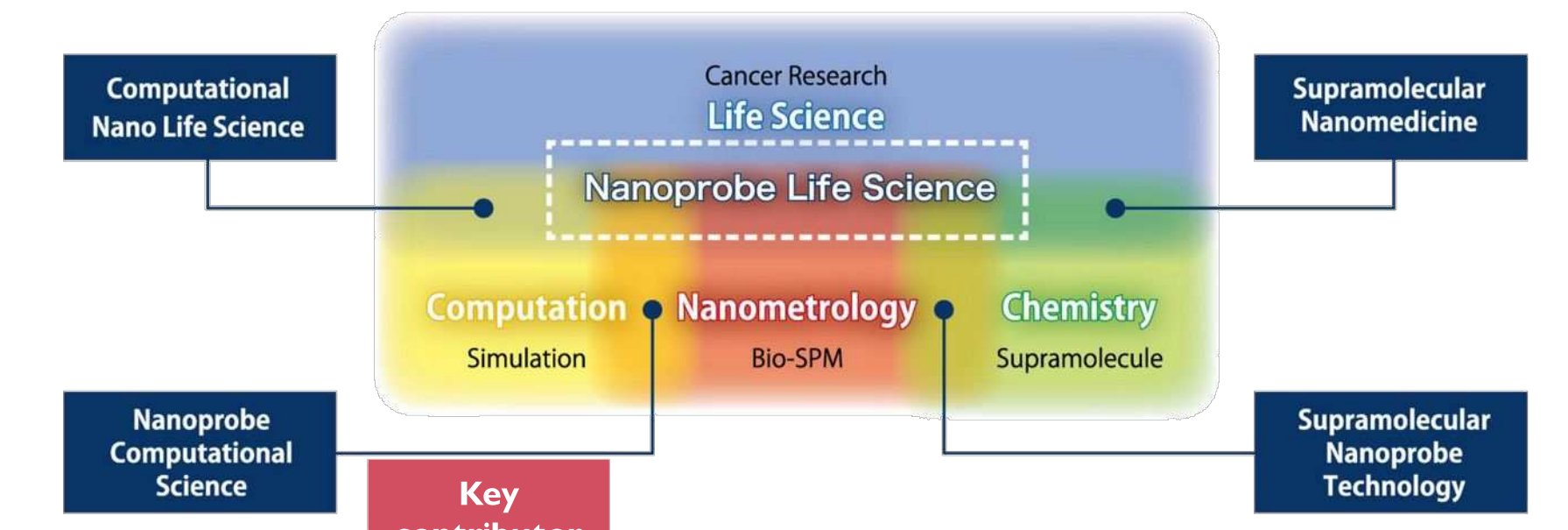
Adam S. Foster  
Aalto University  
(Overseas PI)



Carsten Beta  
University of Potsdam  
(Overseas PI)



Satoru Okuda  
(Jr. PI)



## Supramolecular Chemistry



Shigehisa Akine  
(PI)



Tomoki Ogoshi  
(PI)

## Nanometrology



Takeshi Fukuma  
(PI)



Noriyuki Kodera  
(PI)



Yuri E. Korchev  
Imperial College London  
(Overseas PI)



Kazuki Miyata  
(Jr. PI)



Clemens Franz  
(Jr. PI)



Toshio Ando  
Distinguished Professor of  
Kanazawa University



Satoshi Arai  
(Jr. PI)



Mark J. MacLachlan  
The University of British Columbia  
(Overseas PI)



Katsuhiro Maeda  
(PI)

## Key contributor

# Collaboration with ICL, with the Overseas PI as a Key Contributor

**Key contributor**



**Yuri E. Korchev**  
Imperial College London  
(Overseas PI)

**2018**

**THE 2ND NANOLSI SYMPOSIUM IN LONDON**  
— Towards Establishment of New Research Field: Nanoprobe Life Science

DATE: MONDAY, NOVEMBER 12, 2018  
VENUE: THE CUMBERLAND HOTEL

Timetable		Invited Speakers	
9:00 am	Opening remarks	Prof. Joshua Edel from Imperial College London	
9:10 am	Session 1	Prof. Julia Gorelik from Imperial College London	
10:20 am	Tea break, Poster viewing	Prof. Bart W. Hoogenboom from University College London	
10:50 am	Session 2	Prof. David Klenerman from University of Cambridge	
12:00 pm	Lunch, Poster viewing	Prof. Patrick Unwin from University of Warwick	
1:30 pm	Session 3		
3:10 pm	Tea break, Poster viewing		
3:40 pm	Session 4		
5:20 pm	Closing remarks		
5:50 pm	Banquet		

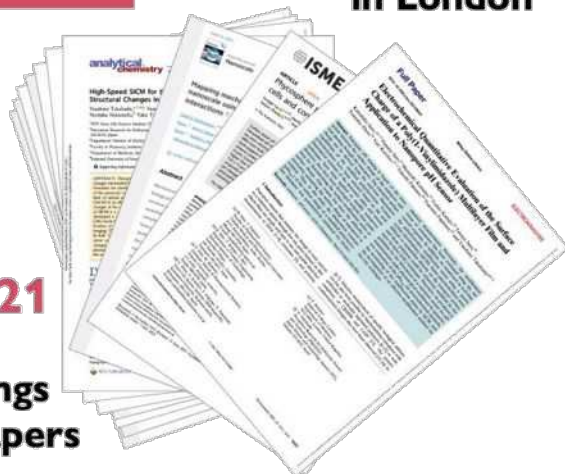
**Contact**  
Administration office of Nano Life Science Institute  
nanolsi-office@adm.kanazawa-u.ac.jp

**NanoLSI Website**  
<https://nanolsi.kanazawa-u.ac.jp/>



- 5 invited speakers from the UK
- 53 participants from worldwide

**NanoLSI Symposium in London**



~ 2021

**Research findings fruition in 9 papers**

**2019**



**ICL Satellite Centre of NanoLSI**



**LT Int'l Joint research agreement**



The facilities in this lab are an integral part of the satellite hub at Imperial College London

**International brain circulation**

# Brain circulation through our unique outreach programmes



## Open Facility Programs at NanoLSI

Opportunities to use world-class Biological Scanning Probe Microscopy Facility



### Introduction

Researchers at Nano Life Science Institute (NanoLSI), Kanazawa University have engaged in the pioneering development of original Biological Scanning Probe Microscopy (Bio-SPM) technologies, such as high-resolution AFM (FM-AFM/3D-AFM), high-speed AFM, and scanning ion conductance microscope (SICM), and applied them to the life sciences. We are pleased to offer you opportunities to use our facilities for imaging your own biological samples or materials for biological research, and realize their potentials. Through the programs, we would like to foster research collaborations and networks.

### Bio-SPM Technologies Available



#### High-resolution AFM [ FM-AFM & 3D-AFM ]

FM-AFM (Frequency-modulation Atomic Force Microscope) can visualize subnanometer-scale surface structures in solution. Combined with 3D scanning technique, it can also visualize 3D distribution of hydration and flexible surface structures at solid-liquid interfaces. The imaging rate is typically 1 min/frame. The spatial resolution is 0.3 nm in the lateral direction and 0.01 nm in the vertical direction.



#### High-speed AFM [ HS-AFM ]

HS-AFM (High-speed Atomic Force Microscope) can visualize moving objects in solution. Its temporal resolution is typically 100 ms/frame, while the spatial resolution is 2-3 nm in the lateral direction and 0.15 nm in the vertical direction. When it is applied to protein molecules in action, the acquired HS-AFM images can provide a significant insight into how the molecules function.



#### Scanning Ion Conductance Microscopy [ SICM ]

SICM has a unique measurement principle and provides unprecedented opportunity that enables submicroscale functional imaging of single live cells by a combination of nanoscale local stimulation and noncontact topography imaging. The imaging rate of SICM is 30-300 s/frame. Spatial resolution of the instrument is 10 nm in the lateral direction and 5 nm in the vertical direction.



#### AFM for Cell Measurement [ HS-AFM & nanoendoscopy-AFM ]

Based on high-speed AFM or 3D-AFM, NanoLSI is developing new AFM technologies. For example, high-speed AFM successfully visualized the surface structure of bacteria at a molecular scale, while a nanoendoscopy-AFM technique developed on the basis of 3D-AFM has succeeded in 3D observation of cell nucleus and actin filaments inside living cells, surface stiffness measurement of cell nucleus, and so on.

### Bio-SPM Summer School



For Young researchers (PhD student, Post doc.)

You can learn how to use Bio-SPM by imaging of your own samples. Experts at NanoLSI teach you on a one-to-one basis.

Period of stay  
1 week in August

Financial support  
Transportation fee and accommodation will be covered in accordance with the regulations of Kanazawa University.

Note  
Hands-on style school

1 call  
Number of call  
per year

- For young researchers
- Hands-on style school
- 1 week in August
- every year

### 2018-2022

- 181 applications from 34 countries
- 73 participants from 15 countries
- 3 participants from the UK



### Bio-SPM Collaborative Research



For Any researchers

This is a program for collaborative research with you and NanoLSI researcher using Bio-SPM.

Period of stay  
Up to several months

Financial support  
Up to 200K JPY for domestic applicants and 350K JPY for overseas applicants

3 calls  
Number of call  
per year

- For any researchers
- Up to several months
- 3 calls per year

### 2018-2022

- 116 applications from 17 countries
- 110 projects from 15 countries adopted
- 1 project from the UK implemented



Prof Bart Hoogenboom  
University College London  
(Biophysicist)

### NanoLSI Visiting Fellows Program



For PIs or Independent researchers

A team of your group visits NanoLSI and works on a project with researchers at NanoLSI.

Period of stay  
More than 1 month (e.g. sabbatical leave)

Financial support  
Transportation fee, accommodation and daily allowance

Note  
Might be accompanied by up to two researchers, postdoc, etc. in his/her own lab.

1 call  
Number of call  
per year

- For PIs
- More than 1 month
- e.g., sabbatical leave
- Anytime in a year



Prof Anthony Watts  
University of Oxford  
(Biophysicist)





Panoramic view of the Kakuma Campus, Kanazawa University

**Thank you** for your kind attention.

