

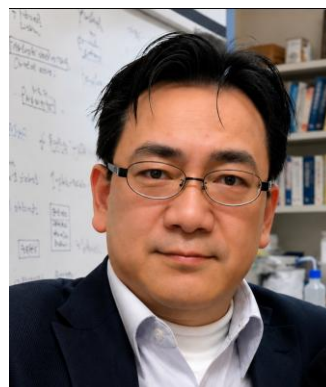
BIO JAPAN 2026

パートナーリング用開示資料

Technology Brief for partnering

ネイティブ生命現象を可視化する次世代AFMナノイメージング技術

Professor WONG, Richard W.
WPI Nano Life Science Institute





タイトル

ネイティブ生命現象を可視化する次世代AFMナノイメージング技術

概要

ネイティブな細胞小器官・生体分子を高速AFMで直接観察し、LAFMによる超解像解析を組み合わせて、ナノ構造とその時間変化を可視化する技術です。「試料調製 → 高速AFM → 超解像 → 時系列解析」を一連の技術として提供します。

解決する課題

固定・凍結・蛍光標識に依存せず、生体試料のネイティブなナノ構造と「動く瞬間」を直接観察できます。

技術の特徴(3点)

1. ネイティブ細胞小器官を直接観察--独自試料調製により高速AFMでナノ観察
2. 分子動態をラベルフリーで可視化--結合・移動・構造変化をリアルタイム追跡
3. ts-LAFMで時系列・超解像解析--分子構造の時間変化を高精細に可視化

技術成熟度

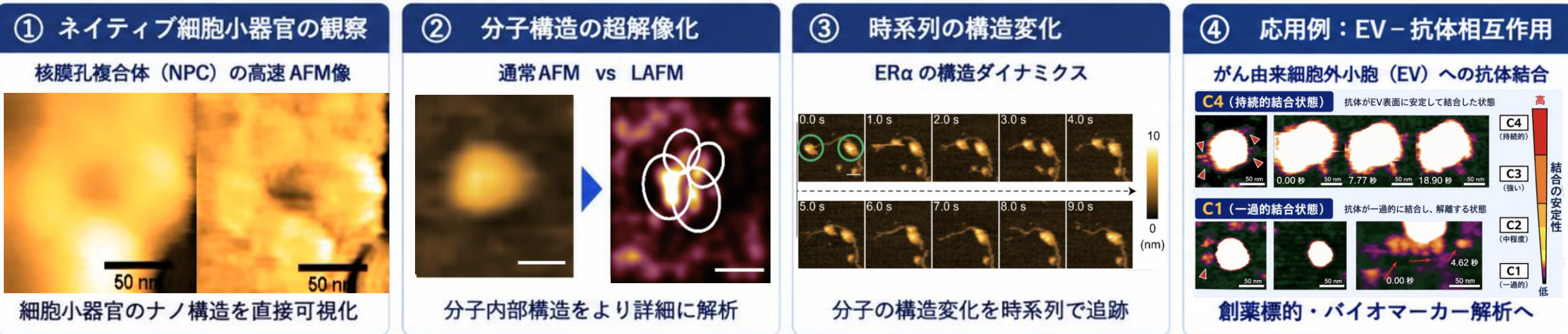
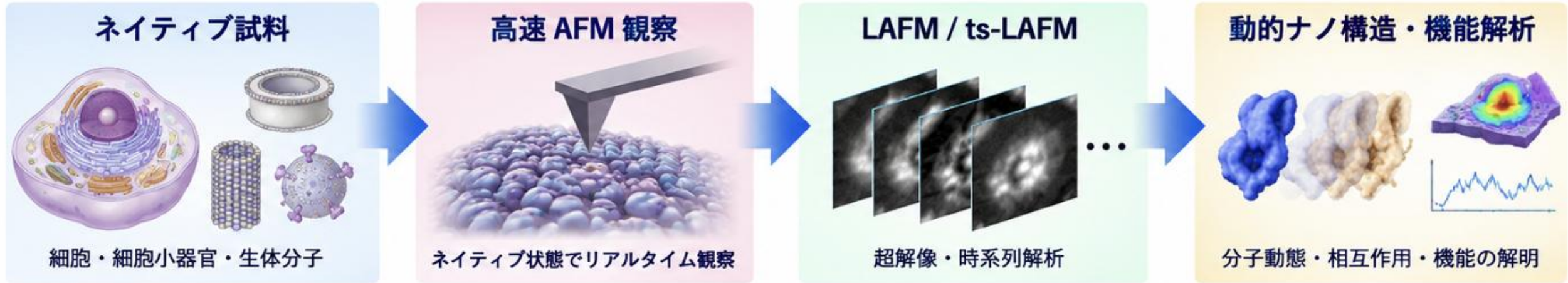
生体分子・細胞小器官の観察を実証済み。産業応用に向けた共同研究を推進中。

知財状況

- 特許第6982863号: 高速原子間力顕微鏡による細胞小器官の観察のための試料の調製方法
- 特願2025-143021号: 画像処理装置、画像取得システム、画像処理方法、画像取得方法及びプログラム

想定連携先 (連携スキーム)

製薬・バイオ、AFM・計測機器、診断関連企業等
(共同研究／PoC／装置・解析開発／ライセンス・事業化)



「静止した構造を見る」から、「分子が働く瞬間を見る」へ



Title	Next-Generation AFM Nanoimaging for Native Biological Dynamics
Summary	Directly visualizes native cellular organelles and biomolecules using high-speed AFM and ts-LAFM super-resolution analysis. Integrated workflow: sample preparation → high-speed AFM → super-resolution → time-series analysis.
Problem	Native nanoscale structures and dynamics are difficult to observe without fixation, freezing, or fluorescent labeling.
Technologies	1. Native organelle imaging — proprietary sample preparation enables nanoscale observation by high-speed AFM. 2. Label-free molecular dynamics — real-time tracking of binding, movement, and structural changes. 3. ts-LAFM super-resolution — high-resolution time-series analysis of molecular structural dynamics.
Development Stage	Demonstrated for biomolecules and cellular organelles; joint research for industrial applications is underway.
IP	1 granted JP patent (sample preparation) & 1 pending JP application (image processing) Applicant/Patentee: Kanazawa University
Collaboration Scheme	Target partners: pharma, biotech, AFM/instrumentation, and diagnostics Schemes: joint research / PoC / device & analysis development / licensing & commercialization

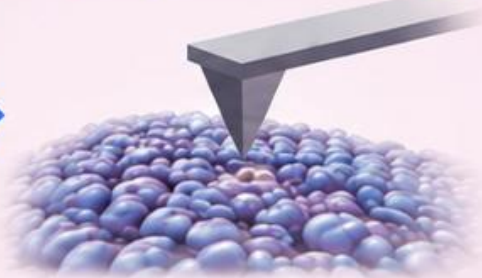


Native Biological Samples



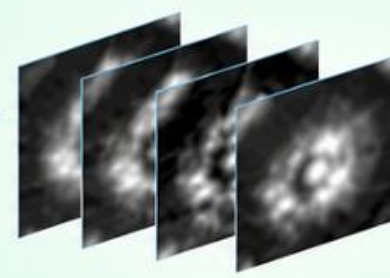
Cells, organelles, and biomolecules
in native state

High-speed AFM Imaging



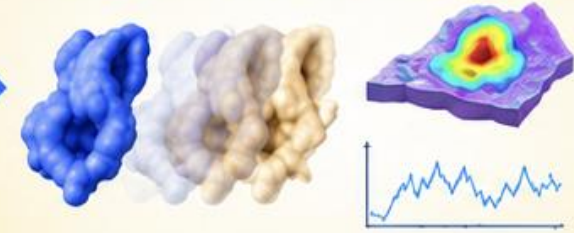
Real-time observation
in native conditions

LAFM / ts-LAFM



Super-resolution and
time-lapse analysis

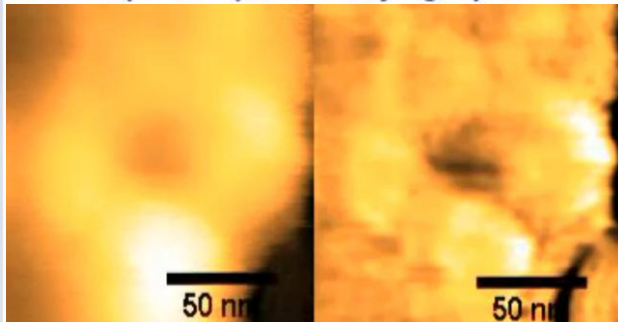
Dynamic Nano-structure and Functional Analysis



Molecular dynamics, interactions,
and functional mechanisms

① Native Organelles

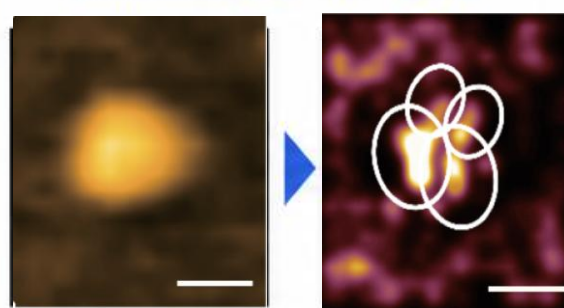
Nuclear pore complex (NPC) by high-speed AFM



Direct visualization of organelle
nano-structures

② Super-resolution of Molecular Structure

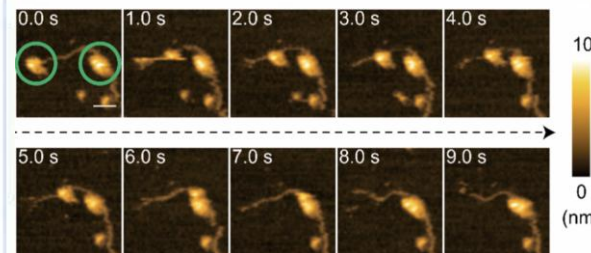
Conventional AFM vs LAFM



Detailed analysis of internal
molecular structure

③ Time-lapse Structural Dynamics

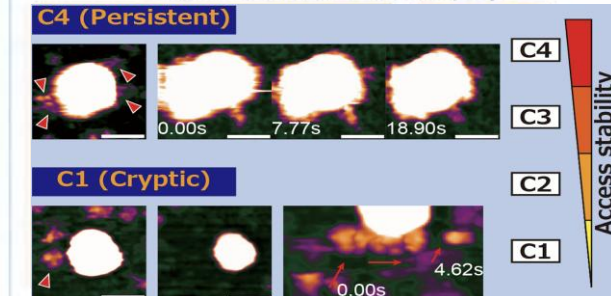
Dynamics of ERα structure



Time-resolved tracking of
molecular conformational changes

④ Application: EV-Antibody Interaction

Real-time observation of antibody binding
to extracellular vesicles (EV)



Towards drug target evaluation and
biomarker analysis

From “Static Structures” to “Molecules in Action”

ご関心をお持ちいただきありがとうございます。

Thank you for your interest.

Contact

Kanazawa University TLO

Please contact us via the BioJapan partnering system or E-mail below.

E-mail: info@kutlo.co.jp