AI-Driven Autonomous AFM for 2D Materials Characterization

Rapid Analysis of 100+ Flakes with Minimal User Intervention

The Challenge

"Conventional SPM imaging requires manual identification of regions of interest and heavily depends on human intuition for image interpretation, which severely limits the ability to collect large datasets and conduct objective analysis."

SUNG KYUN KWAN UNIVERSITY

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— Prof. Yunseok Kim
Department of Advanced Materials Science & Engineering

Your Challenge, **Our Solution**

Park FX40



This case study is based on a presentation by Prof. Yunseok Kim of Sungkyunkwan University at NANOscientific Symposium Korea 2026. The Park FX40 enabled AI-driven autonomous AFM workflows for efficient and reproducible characterization of 2D materials.

Park SYSTEMS

Park FX40
Customer Success Story

SUNG KYUN KWAN UNIVERSITY (SKKU)

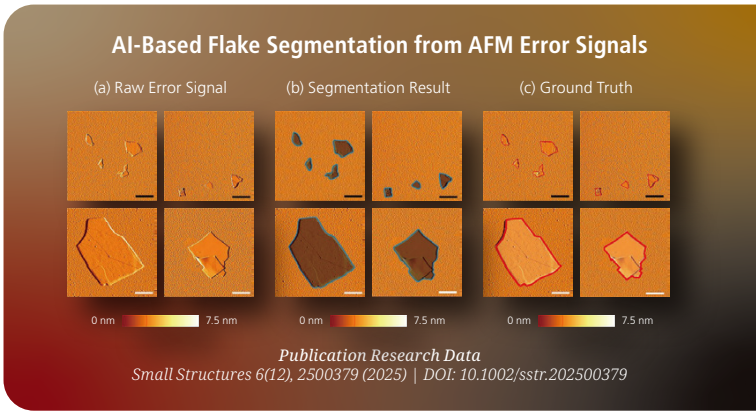


The Solution

AI-Based Flake Identification
Automatically identifies and segments 2D flakes from large-area AFM scans using deep learning

Autonomous AFM Measurement
Connects Python scripts with FX40 via SmartRemote to automate AI-guided measurements

Multimodal Property Characterization
Combines topography and KPFM to analyze thickness and work function



Automated Data Analysis
Segments complex and overlapping flakes for automated property extraction

Related Publication: This capability is further demonstrated through peer-reviewed research from Sungkyunkwan University and KAIST, presenting an AI-driven autonomous SPM workflow that uses AFM error signals to identify and segment 2D material flakes for automated characterization. Published in Small Structures. (DOI: 10.1002/sstr.202500379)

The Results

High-Throughput Characterization
Characterizes over 100 $MoWTe_2$ flakes autonomously

End-to-End Automation
Automates the workflow from flake identification to property extraction

Correlated Property Analysis
Correlates flake thickness directly with work function

Scalable Materials Exploration
Extends autonomous analysis across diverse material systems

"With Park FX40 and AI-driven automation, we can move beyond conventional manual AFM workflows and explore nanoscale material properties more efficiently and systematically."

— Prof. Yunseok Kim

