

# Oxford Instruments Nanoanalysis products and solutions for textile analysis

Lucia Spasevski

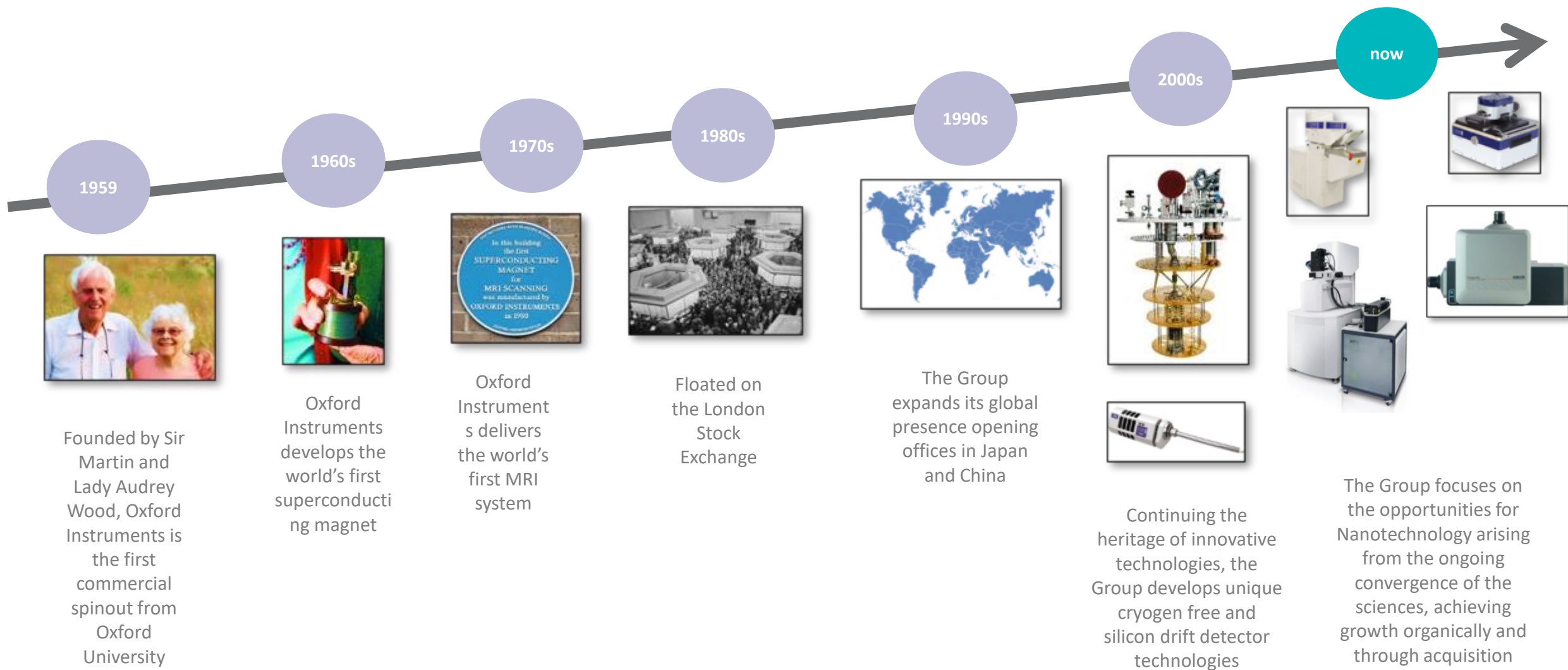
X-Ray Product Manager

28/09/2023

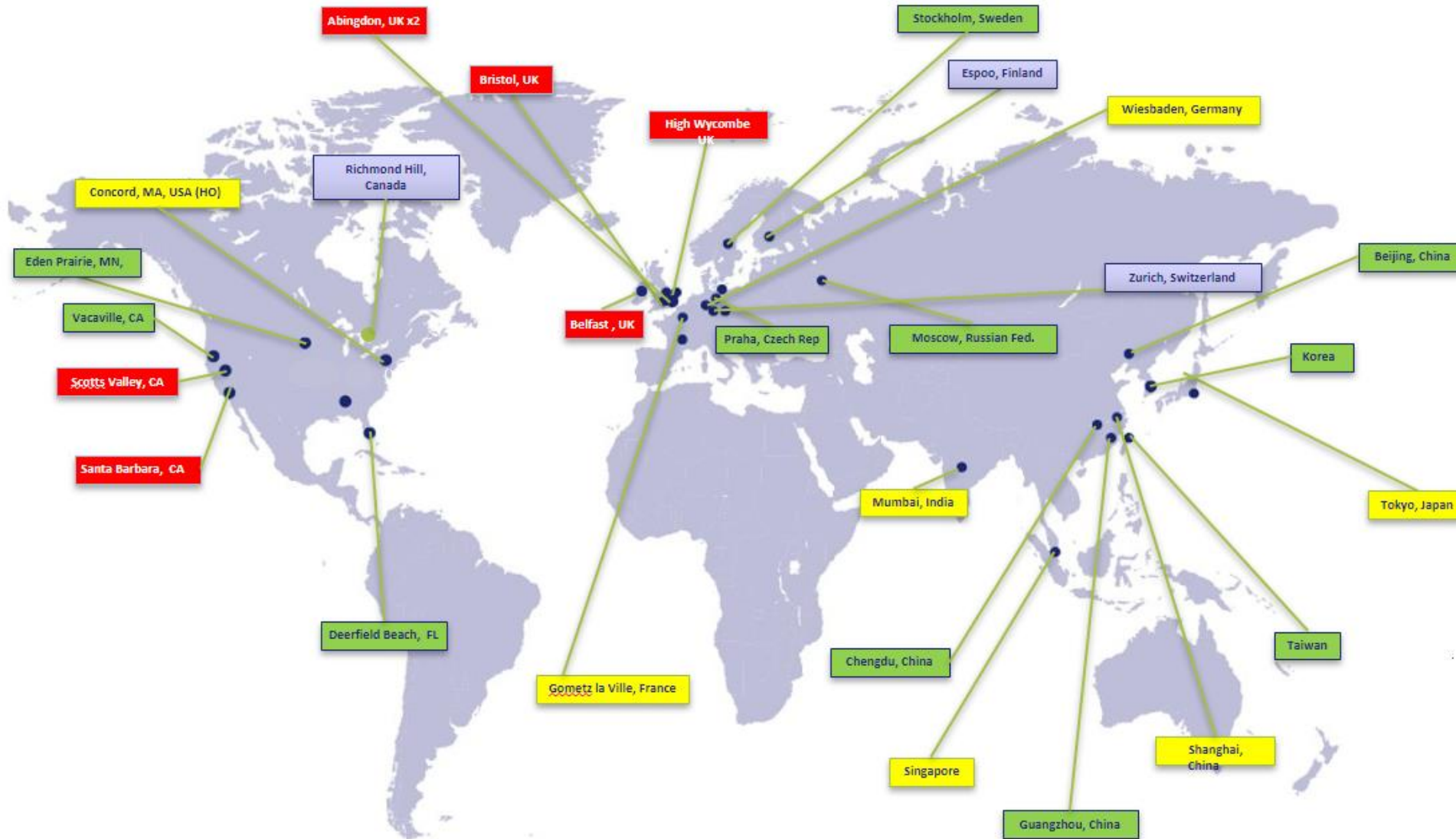
**“The first commercially successful spin-out from Oxford University”**



# History



# Global Offices



**Manufacturing**   **Rep Office**   **Sales/service office**   **Development sites**

**We have offices in 18 countries and employ over 1600 people worldwide**

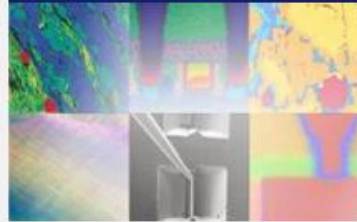
# Our business



## Materials & Characterisation

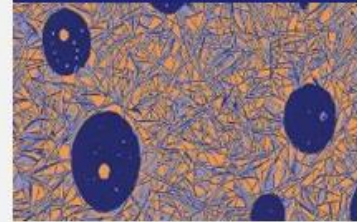
Products and solutions that enable the fabrication and characterisation of devices down to the atomic scale.

### NANOANALYSIS



Enabling materials characterisation and sample manipulation at the nanometre scale

### ASYLUM



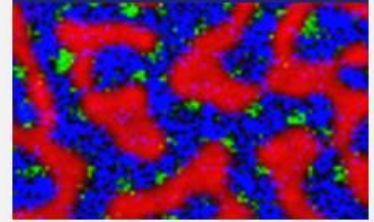
Leader in development & manufacture of Atomic Force Microscopy (AFMs)

### PLASMA TECHNOLOGY



Leading provider of etch and deposition processing solutions and recipes

### WITec



Leading provider of highly modular Raman Spectroscopy Systems



## Research & Discovery

Provides advanced solutions that create unique environments and enable imaging and analytical measurements down to molecular and atomic levels.

### ANDOR



Development & manufacture of high performance scientific digital cameras and light microscopes

### MAGNETIC RESONANCE



Offering a range of benchtop Nuclear Magnetic Resonance (NMR) instruments

### NANOSCIENCE



Enabling quantum technologies, nano technology research, advanced materials & nano device development

### X-RAY TECHNOLOGY



Leading manufacturer of x-ray tubes, power supplies & integrated x-ray sources



## Oxford Instruments – Analytics for SEM

## WDS

### Wavelength Dispersive X-ray Spectroscopy (WDS)

#### Wave

Chemical analysis at  
high energy resolution  
in the SEM



## EDS

### Energy Dispersive X-ray Spectroscopy (EDS)

**Ultim Max, Ultim Extreme silicon drift  
detectors**

Chemical analysis in the SEM and  
TEM

## EBSD

### Electron Backscatter Diffraction (EBSD)

**Symmetry CMOS camera**

Structural analysis and phase ID in  
the SEM

## Nanomanipulation

**OP400 4-axis piezo driven manipulator**

Material manipulation in the SEM and FIB

# Current Product Range

SEM



Xplore 15 and 30 EDS



Ultim Max 40, 65, 100, 170 and Extreme

X4



TEM



Ultim Max Xplore, TEM and TLE

Xplore TEM	Ultim Max TEM	Ultim Max TLE	2x Ultim Max TLE
80mm <sup>2</sup> for fast, accurate elemental characterisation	80mm <sup>2</sup> for elemental mapping of nanostructures	100mm <sup>2</sup> for elemental characterisation at the atomic scale	200mm <sup>2</sup> for elementally mapping atoms
SATW window for ease of use	Windowless for improved low energy sensitivity	Windowless for improved low energy sensitivity	Windowless for improved low energy sensitivity
0.2 - 0.3 srad*	0.2 - 0.5 srad*	0.4 - 1.0 srad*	2 srad*



# Ultim Max EDS detectors

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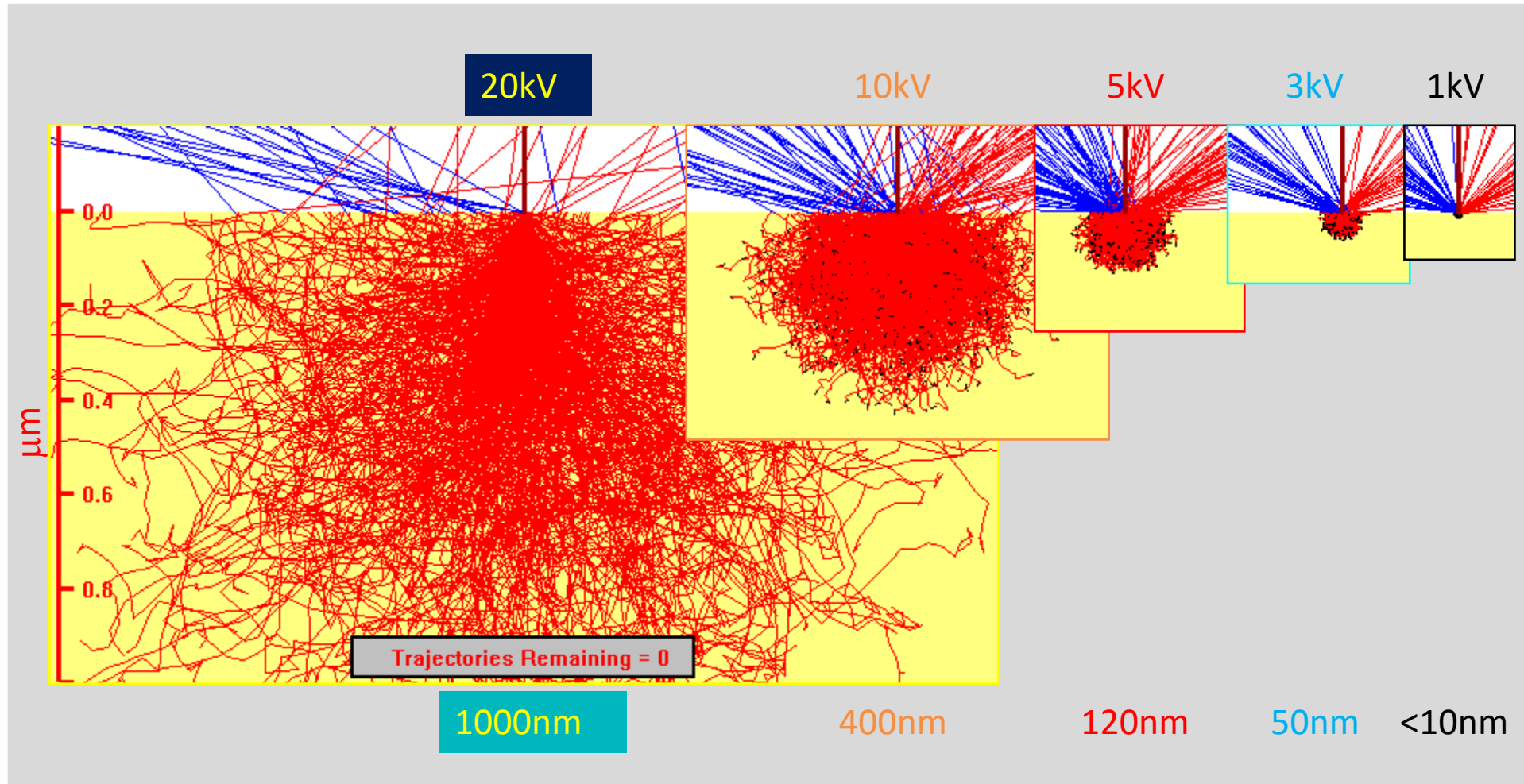


Analyse 17x more of your sample in the same time

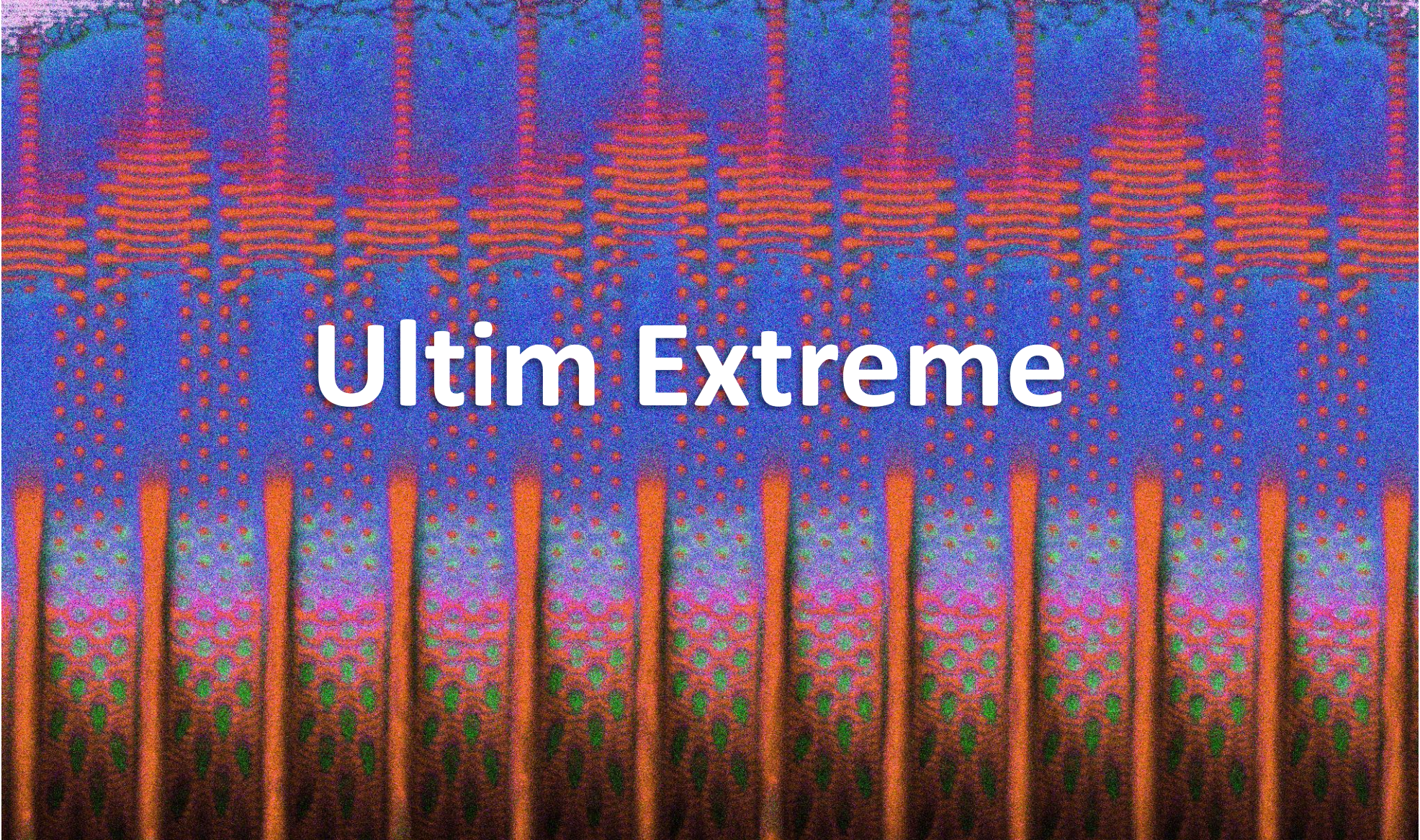
ULTIM **MAX**

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# Accelerating voltage and interaction volume



Monte Carlo Simulations – Fe  $L\alpha$  in Pure Fe

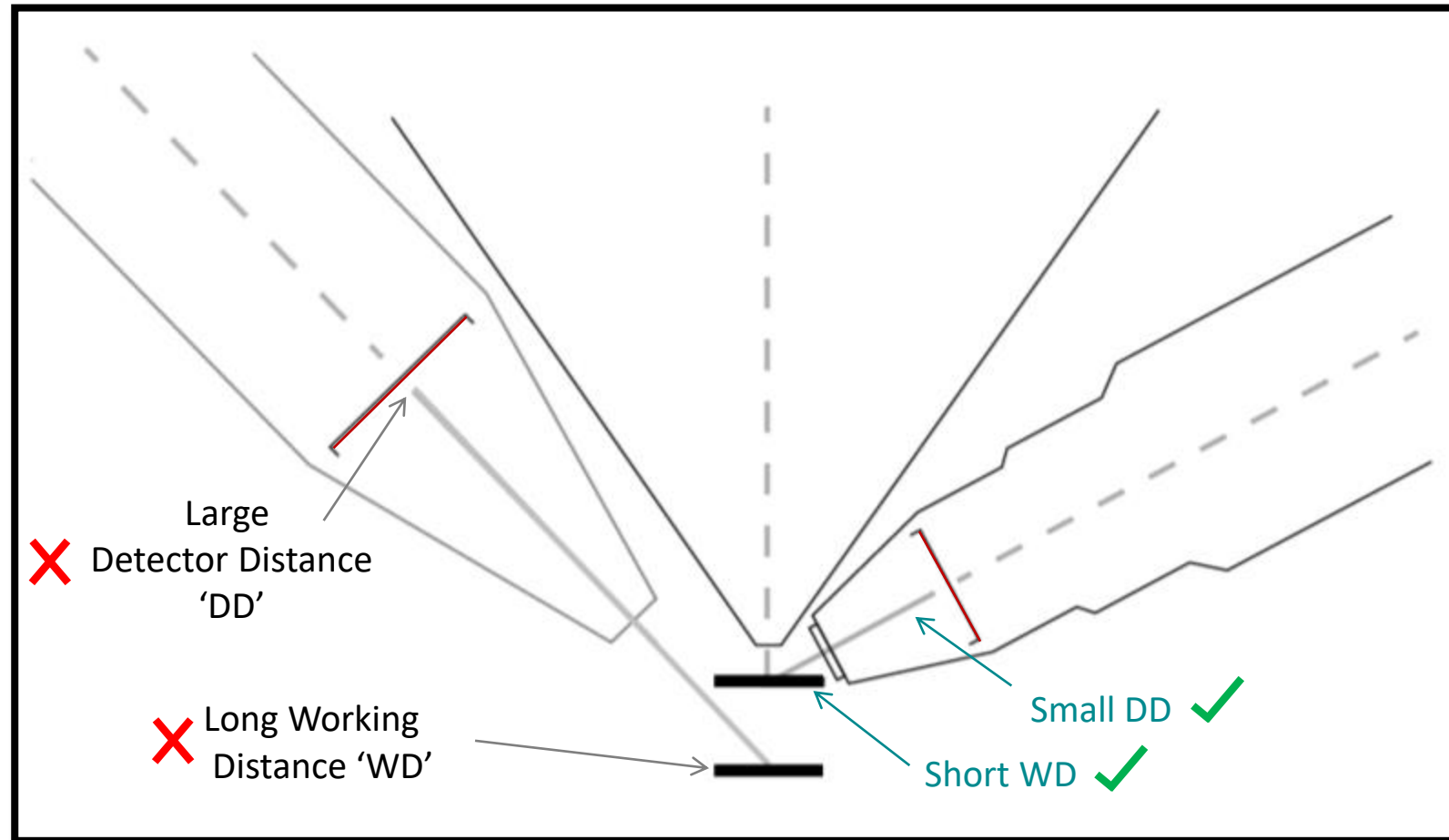
A microscopic image of a woven fabric, showing a complex pattern of blue, orange, and green fibers. The text "Ultim Extreme" is overlaid in white.

# Ultim Extreme

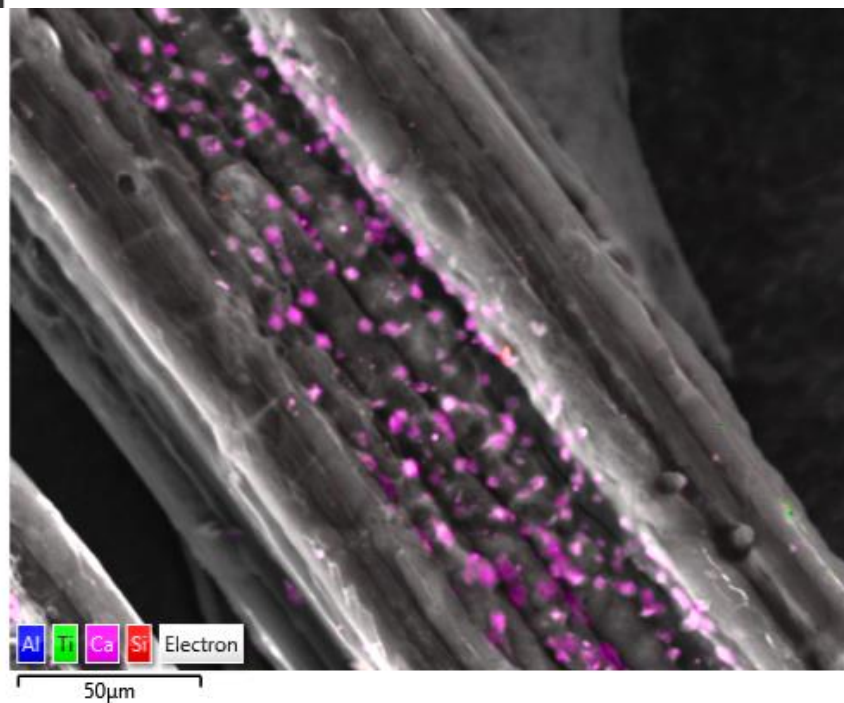
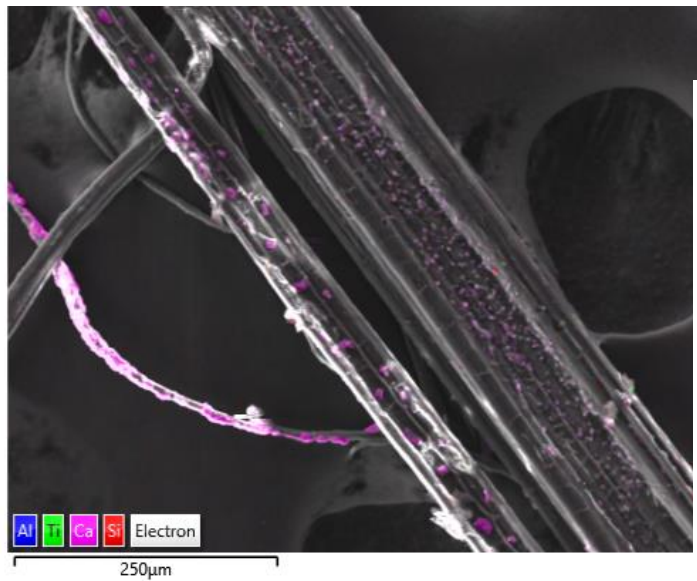
# Optimised Geometry

Standard  
EDS

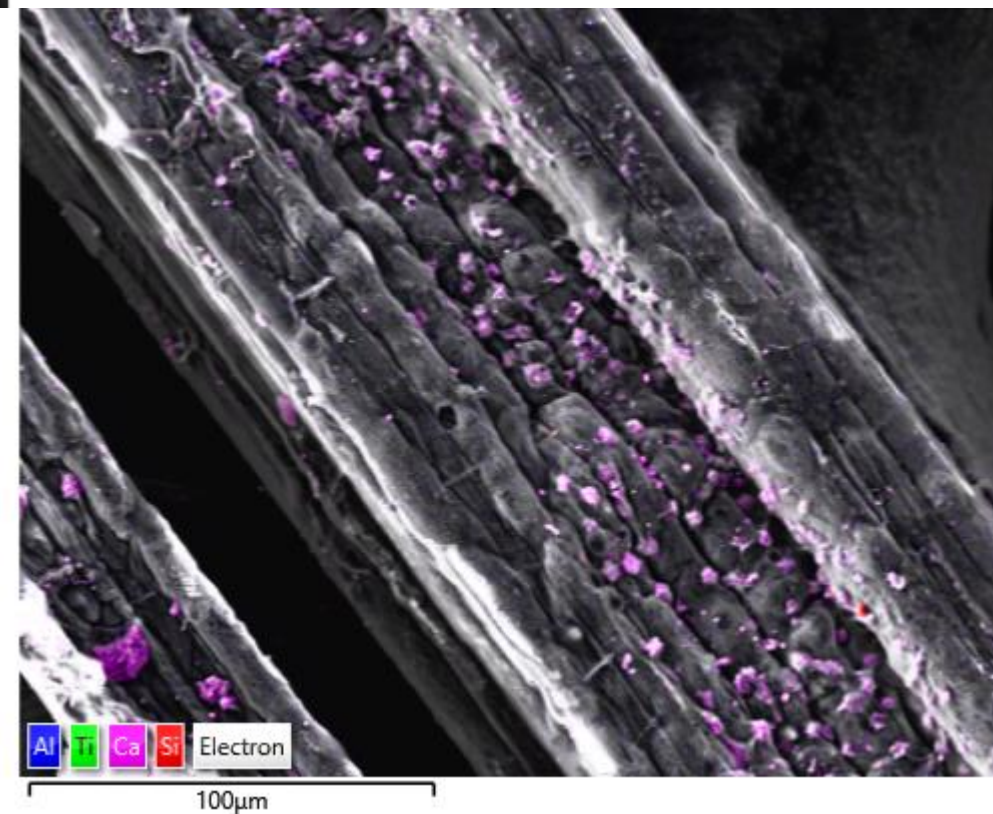
Ultim  
EXTREME



Ultim 100 20kV 20 nA

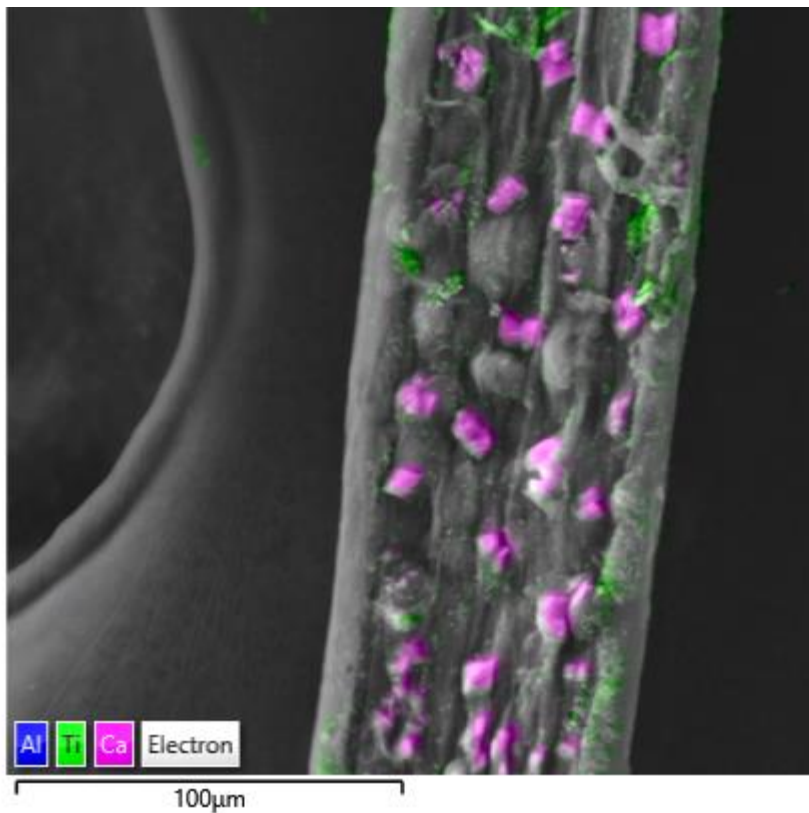


Ultim 100 10kV 7 nA

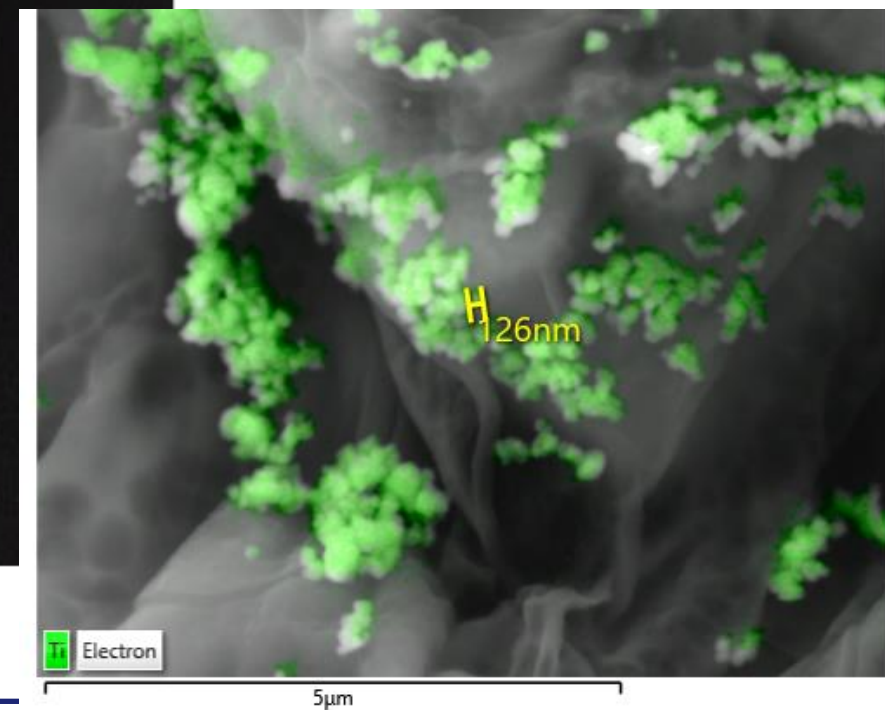
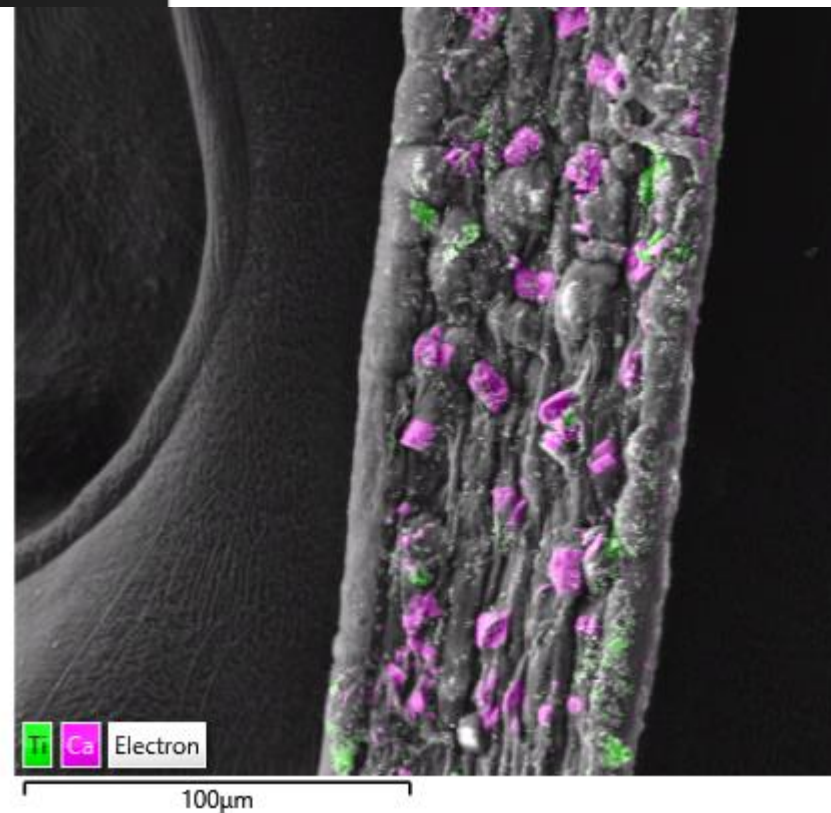


### Improvement in resolution with reduction of kV

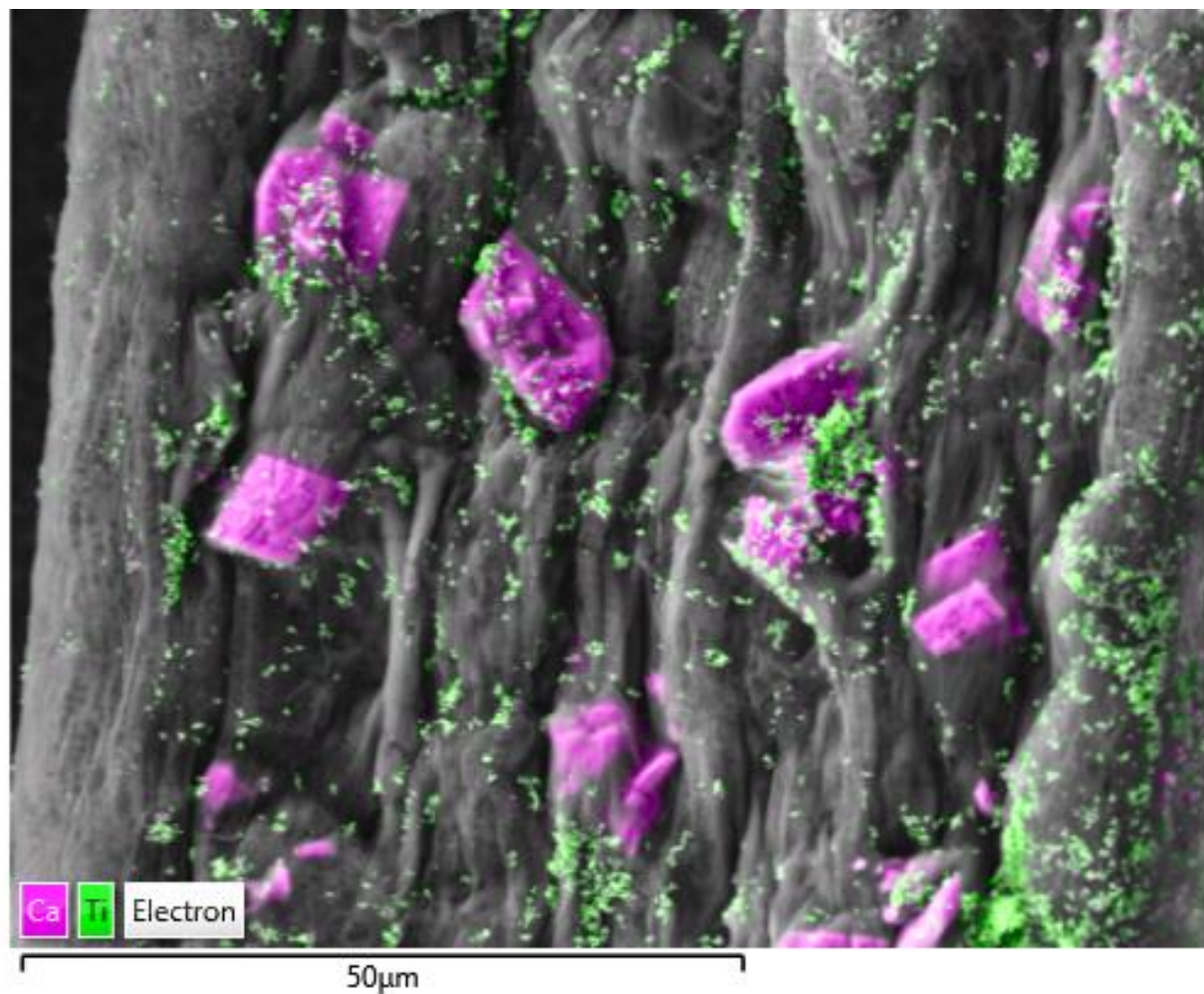
Ultim 100 20kV 20 nA



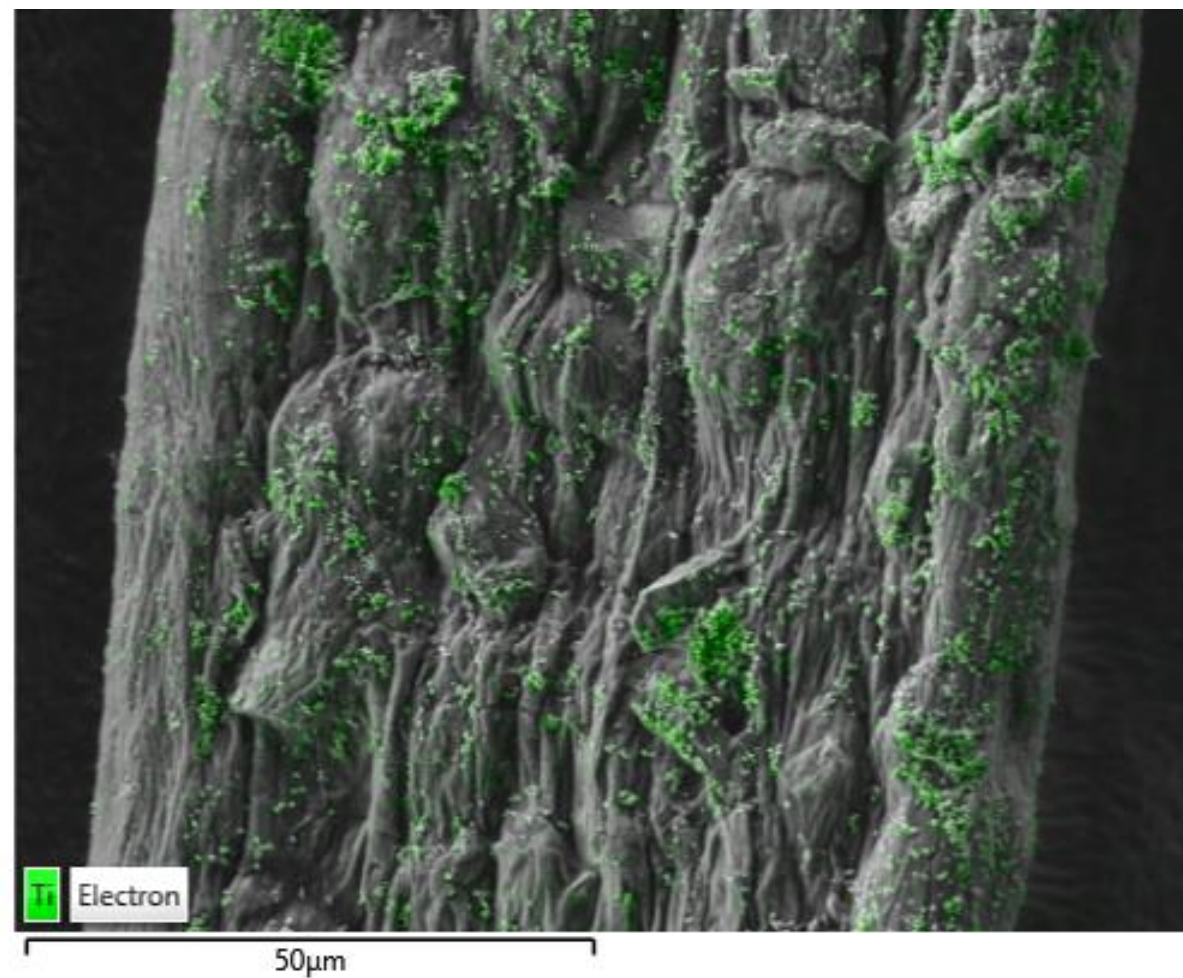
Ultim 100 10kV 7 nA



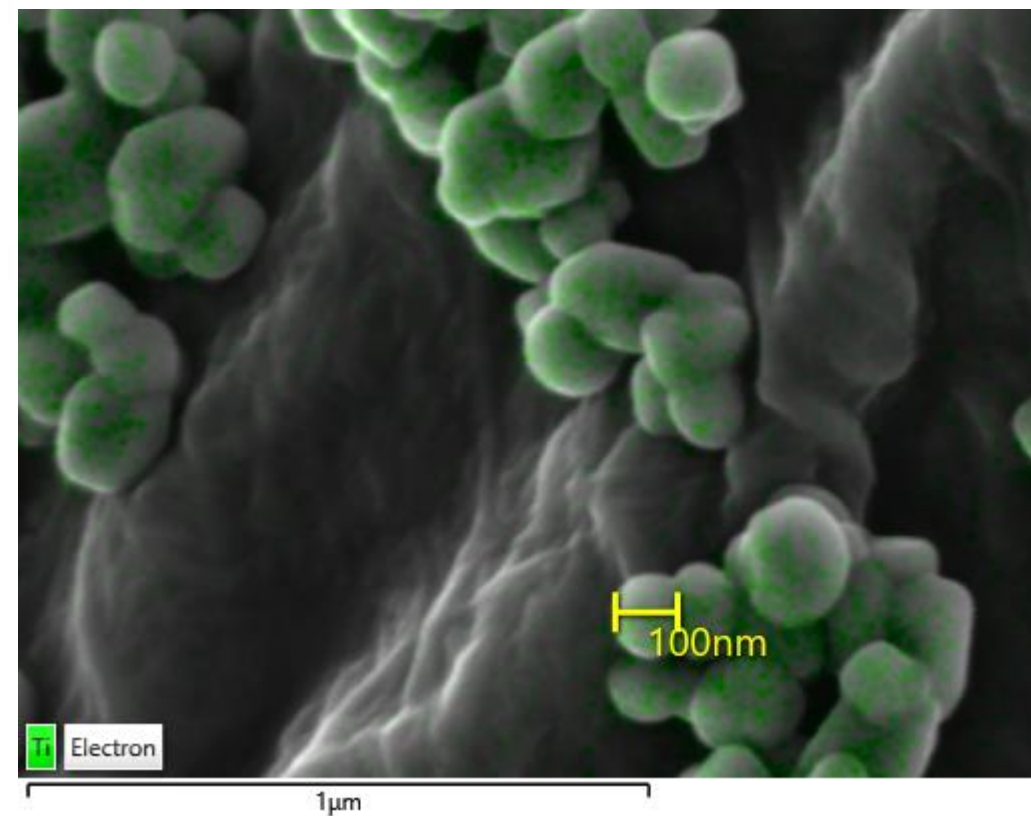
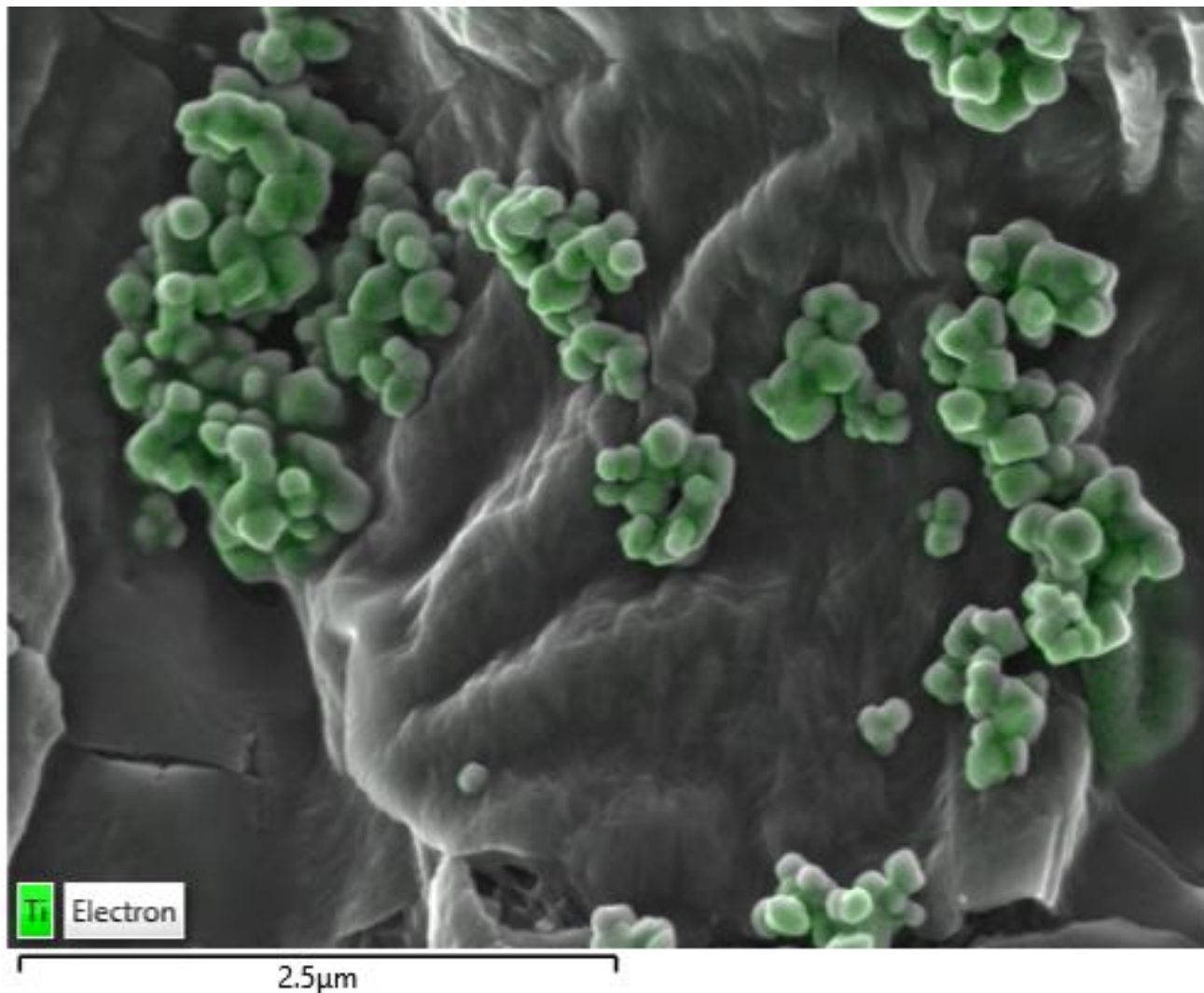
Ultim 100 10kV 7 nA



Extreme 5kV 1nA

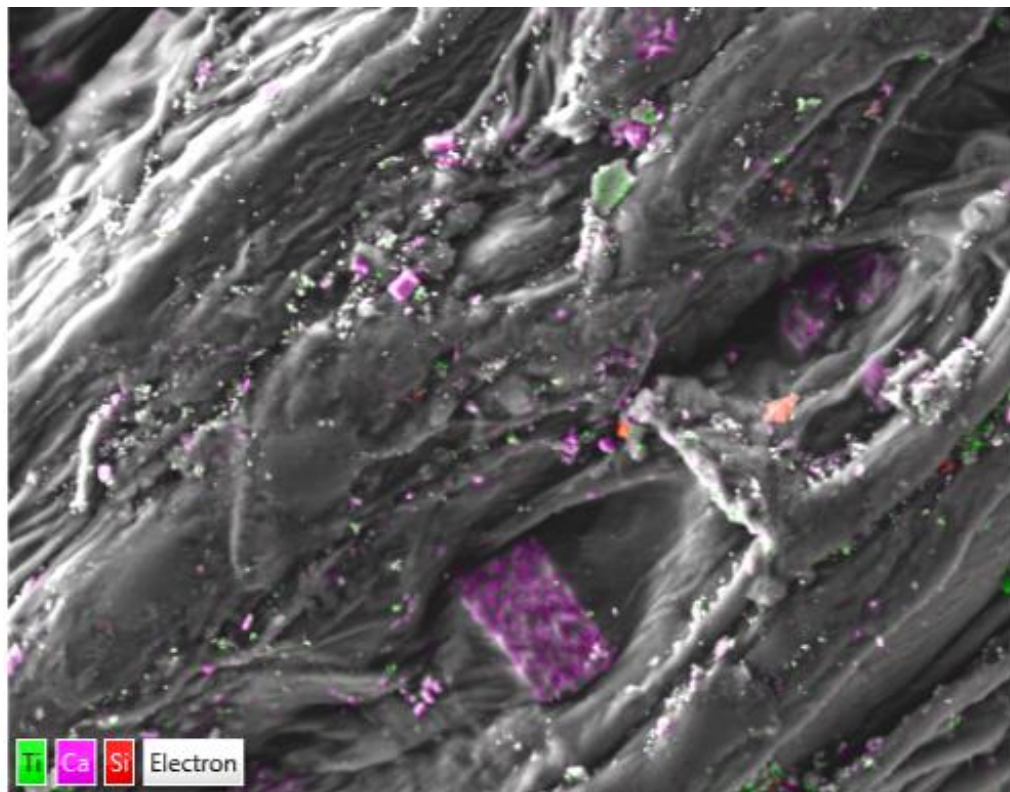


Extreme 3kV 700pA

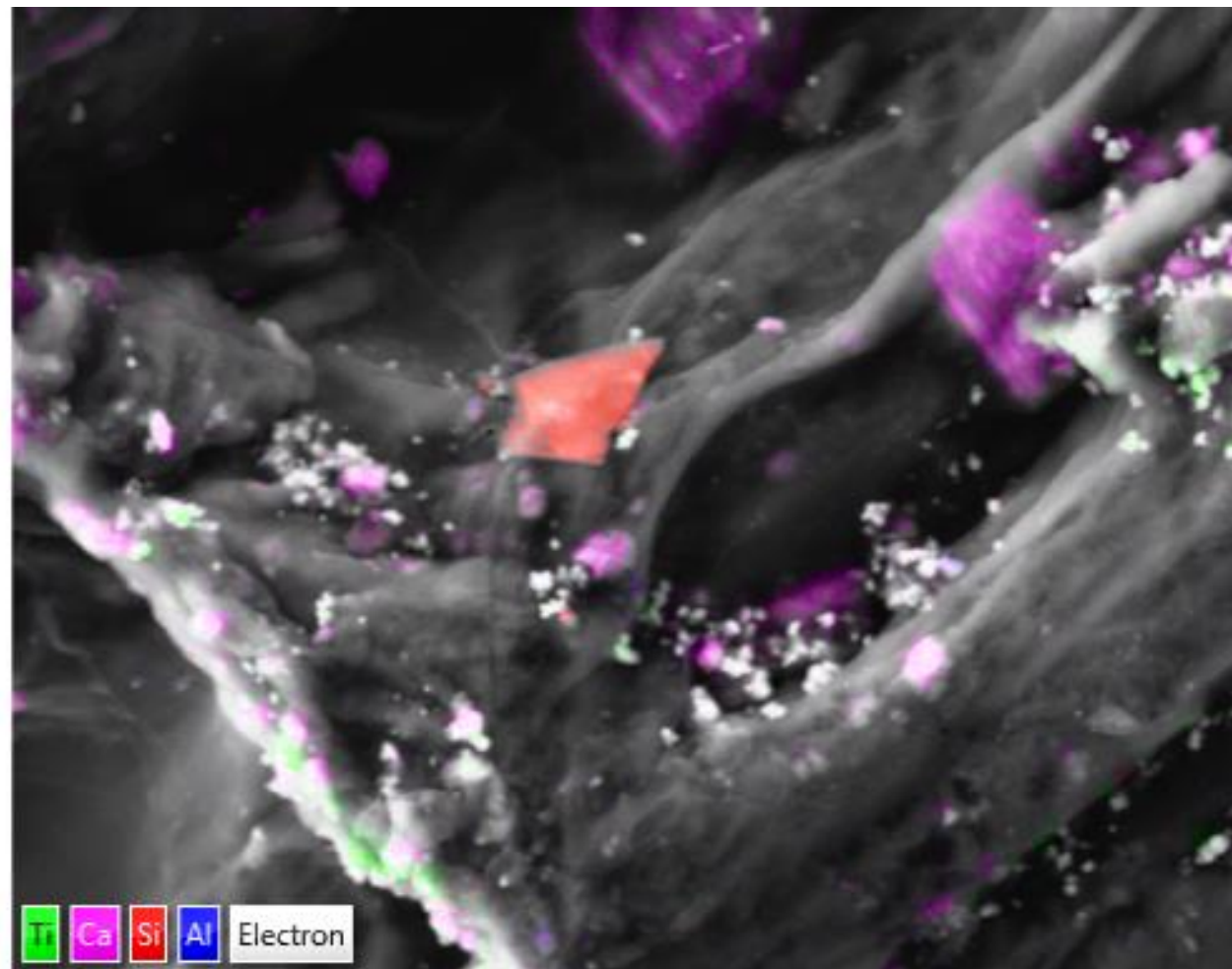




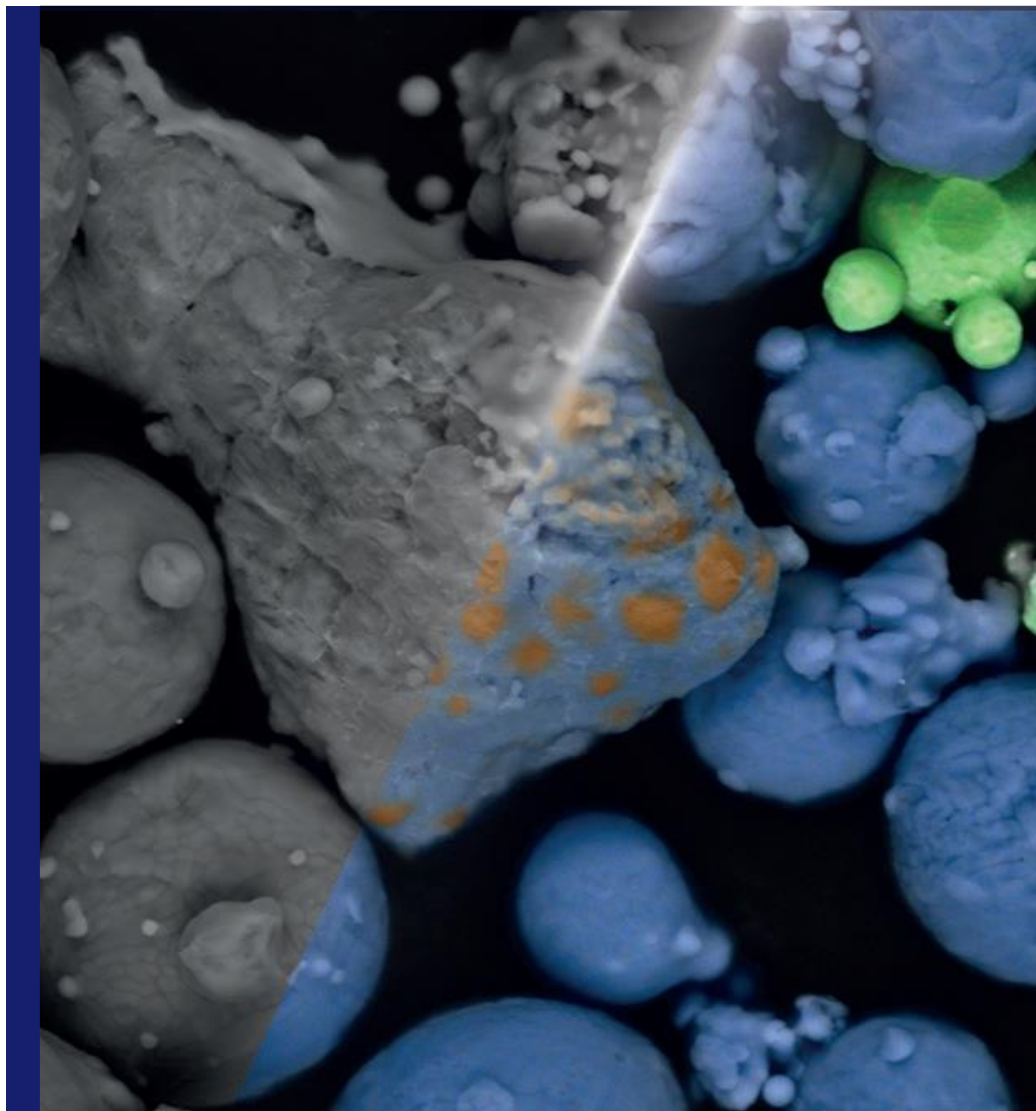
Extreme 7kV 1 nA



50µm



10µm



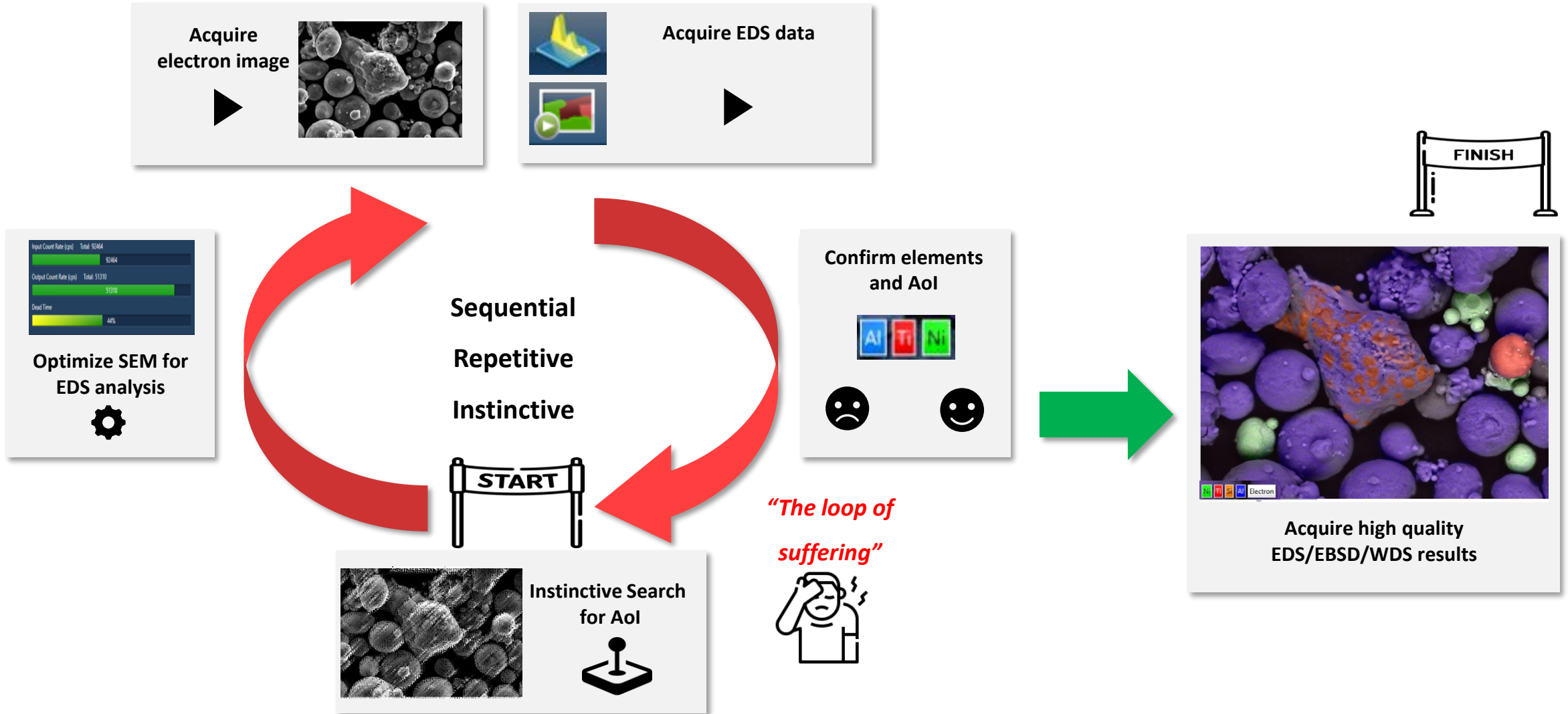
# Unity

## BEX Imaging detector



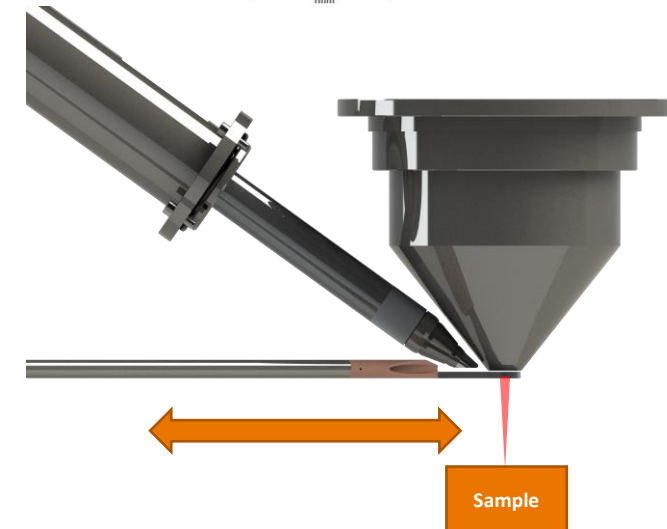
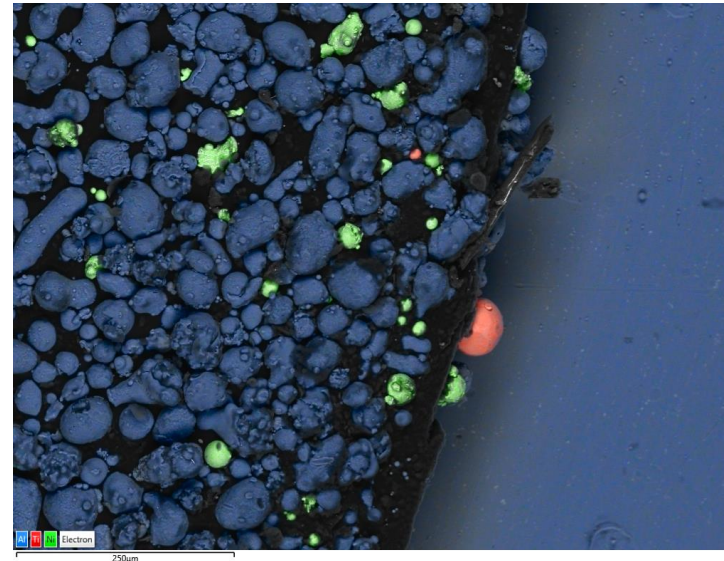
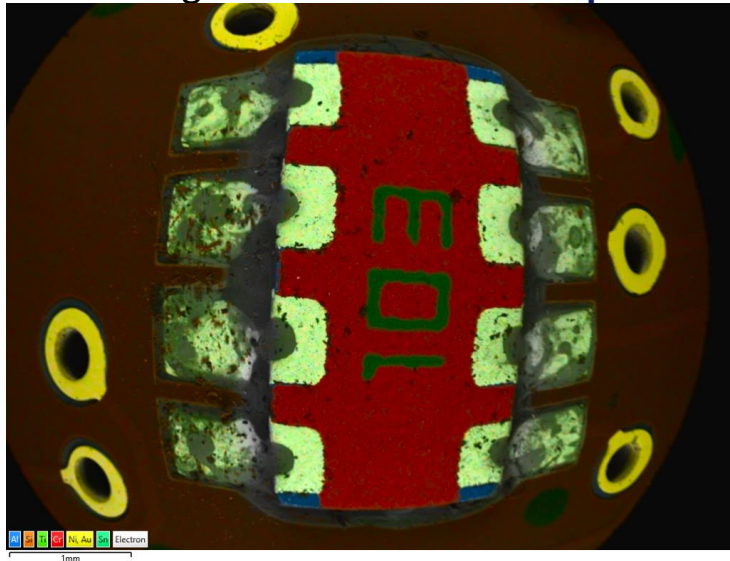
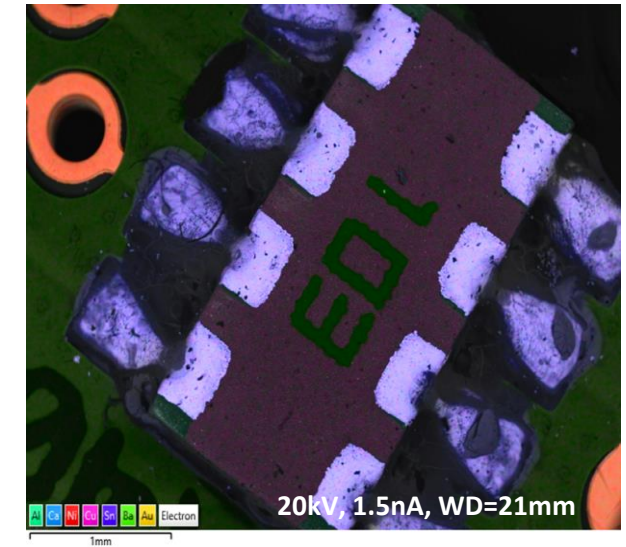
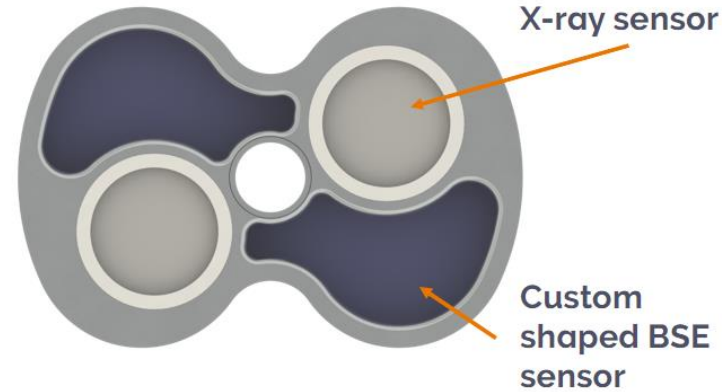
New product release!

# Traditional Imaging & Analysis



# Designed for Daily Imaging

- Optimised for normal imaging conditions <20kV, 1nA
- Flexible Working Distance >6mm
- **Large Field of View**  
(compatible with Wide Field modes)
- **No shadowing** unlike SEs and conventional EDS
- Flat Tube Design for **safe sample navigation**
- Exchangeable sensor head for **peace of mind**





Map



▶ SCAN

▶ SPOT

■ STOP

Imaging Modes: 1 2 3

Settings



▶ CAPTURE



Custom Cartography

Help

Image



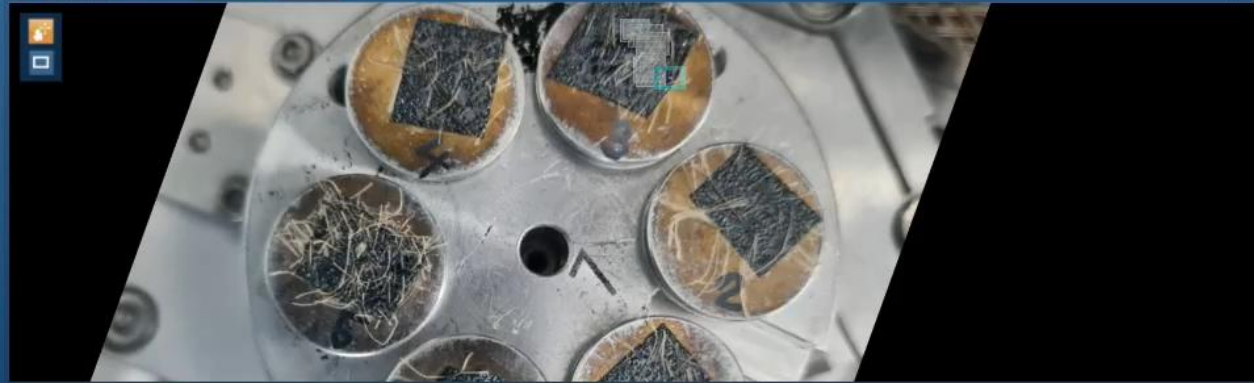
Maps

Cartography

Automation

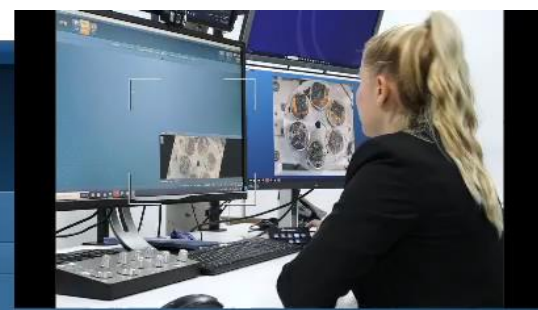
▶ RUN

■ STOP



Selected Element: None

Move To





Map



▶ SCAN

▶ SPOT

■ STOP

Imaging Modes: 1 2 3

Settings



▶ CAPTURE

Custom Cartography

Help

Image

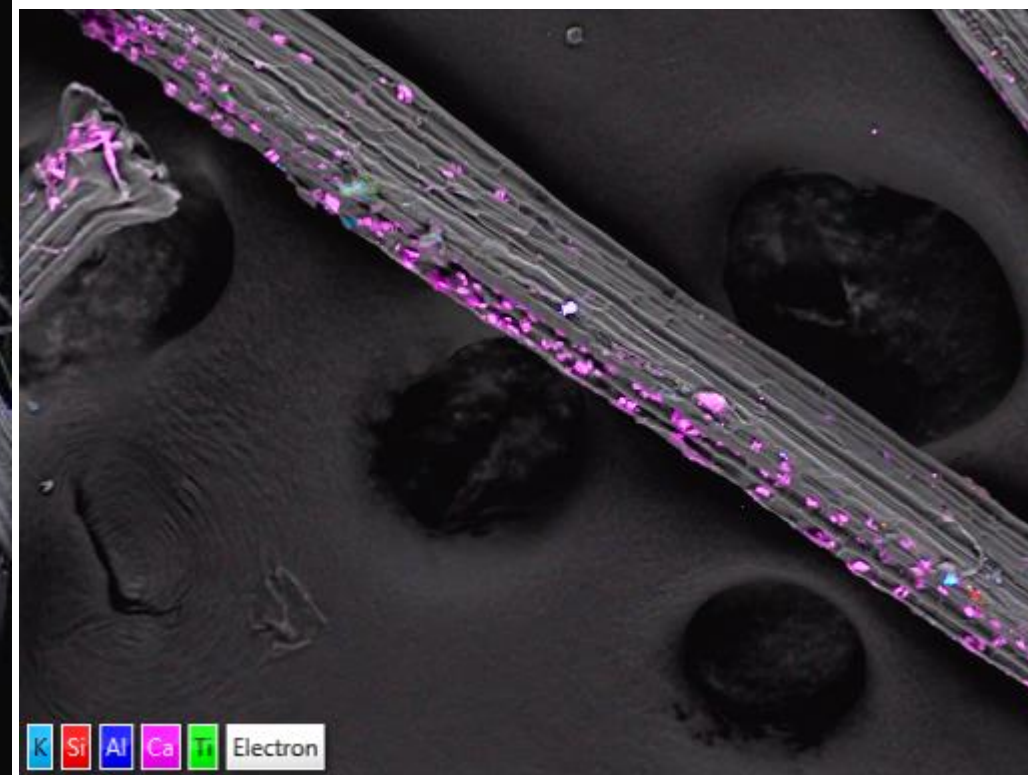
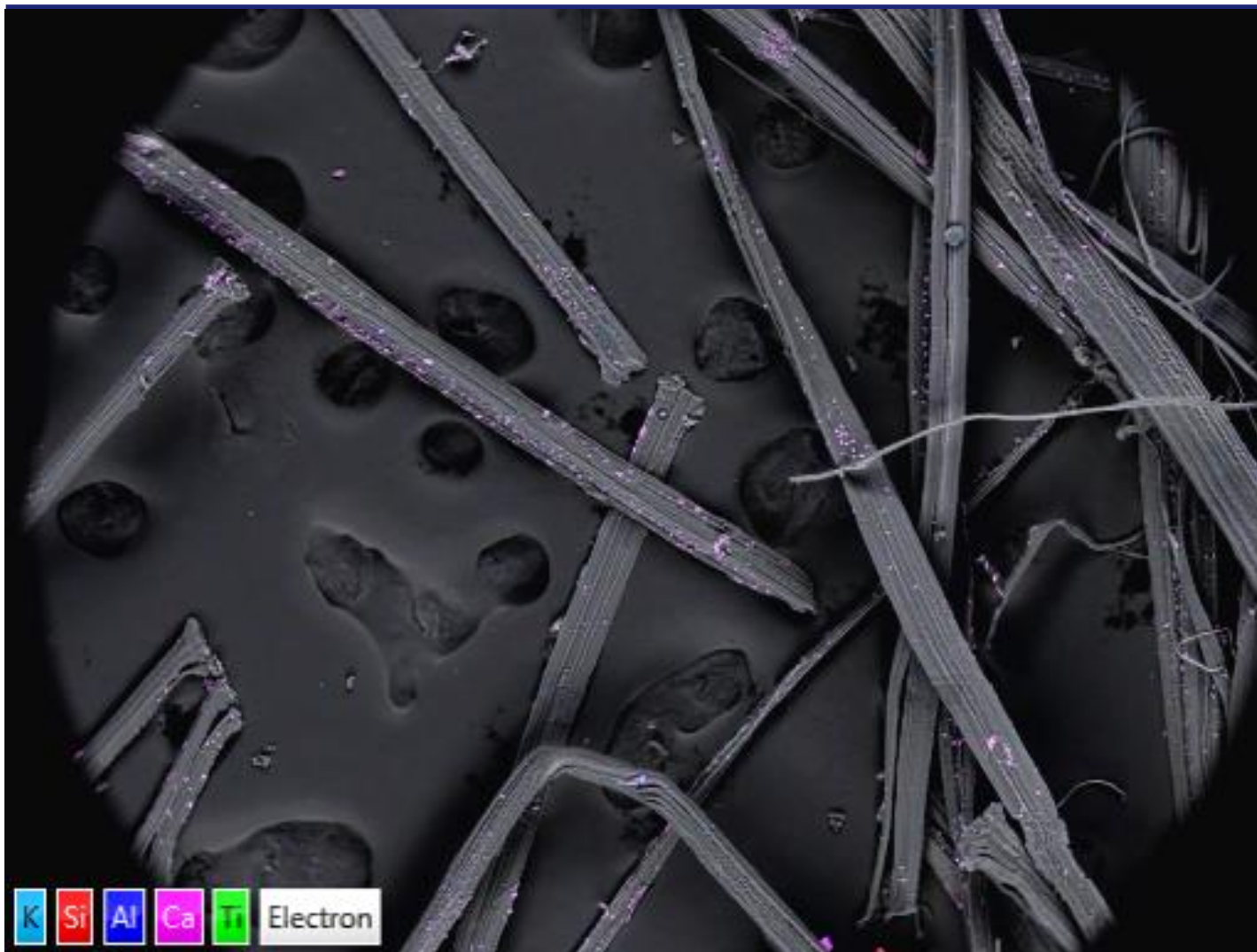
Maps

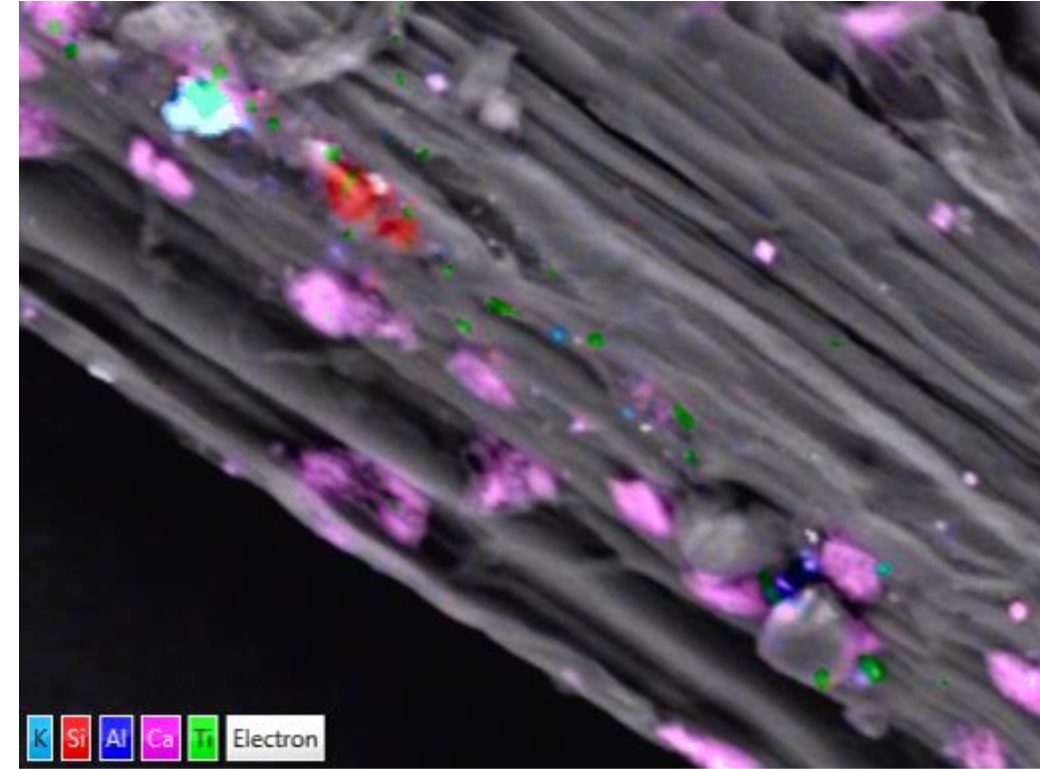
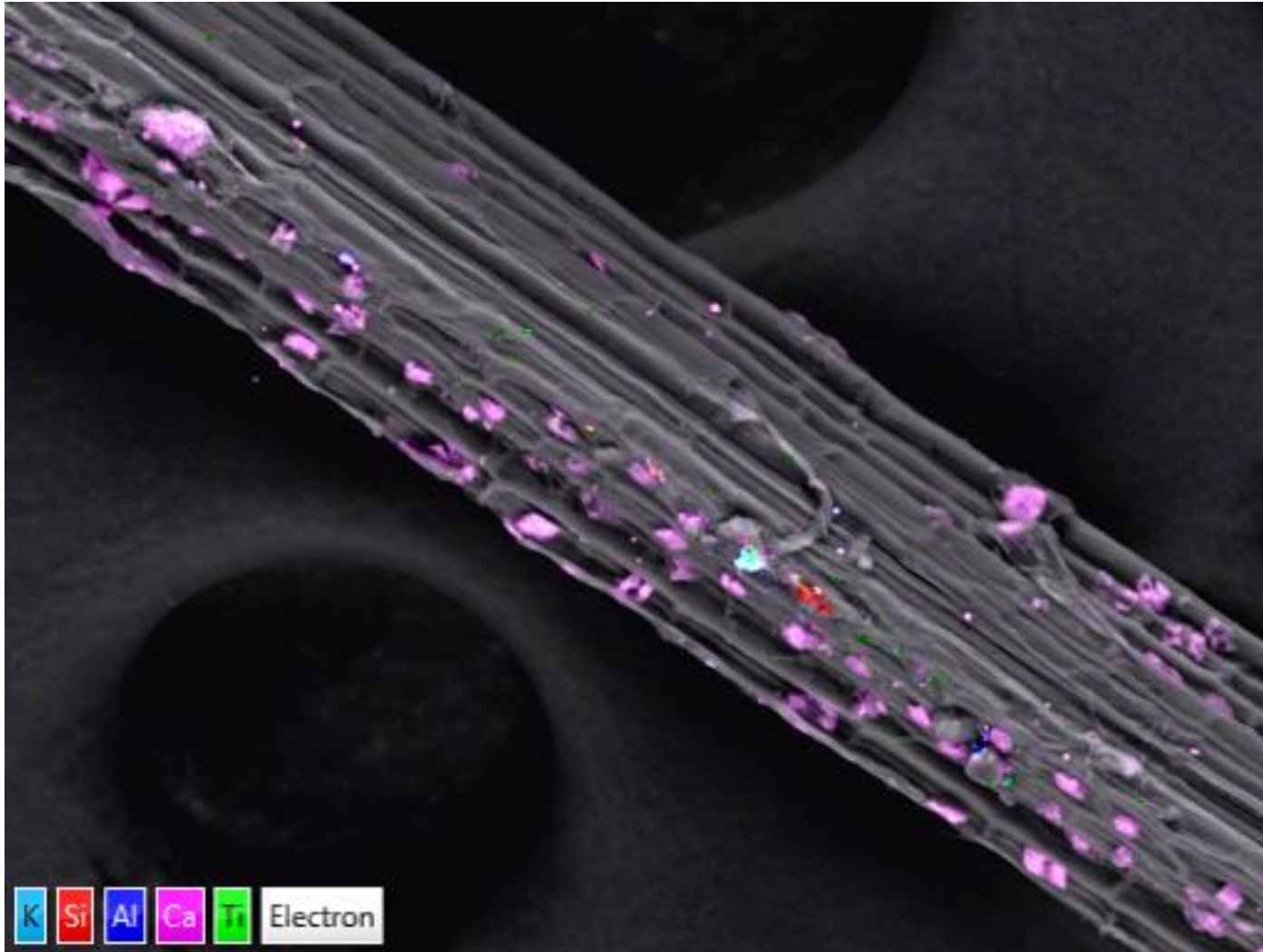


Cartography Automation ▶ RUN ■ STOP



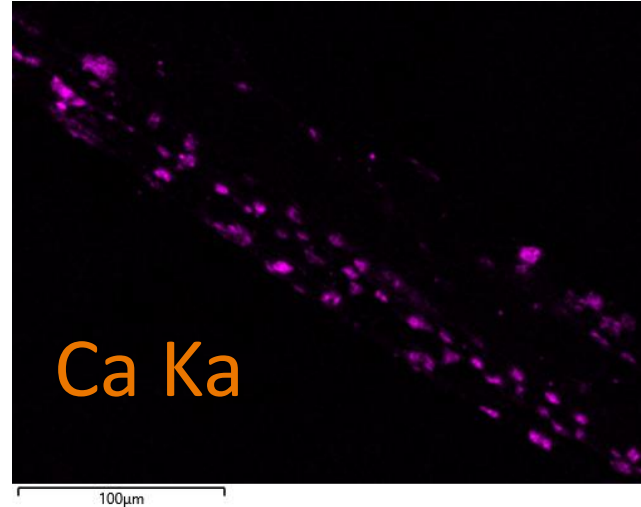
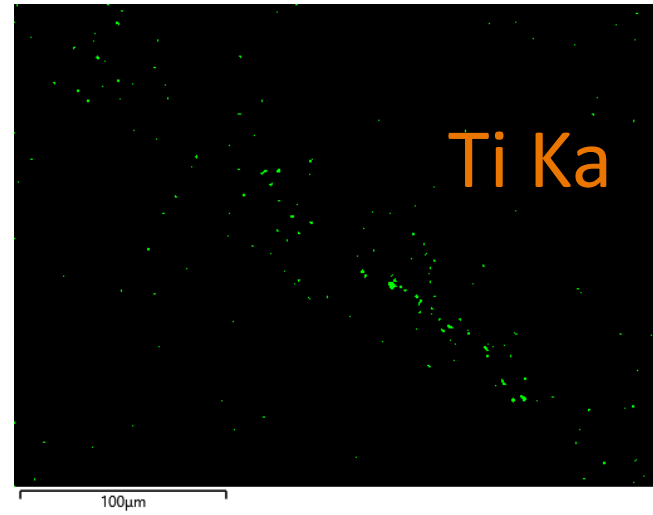
Selected Element None Move To

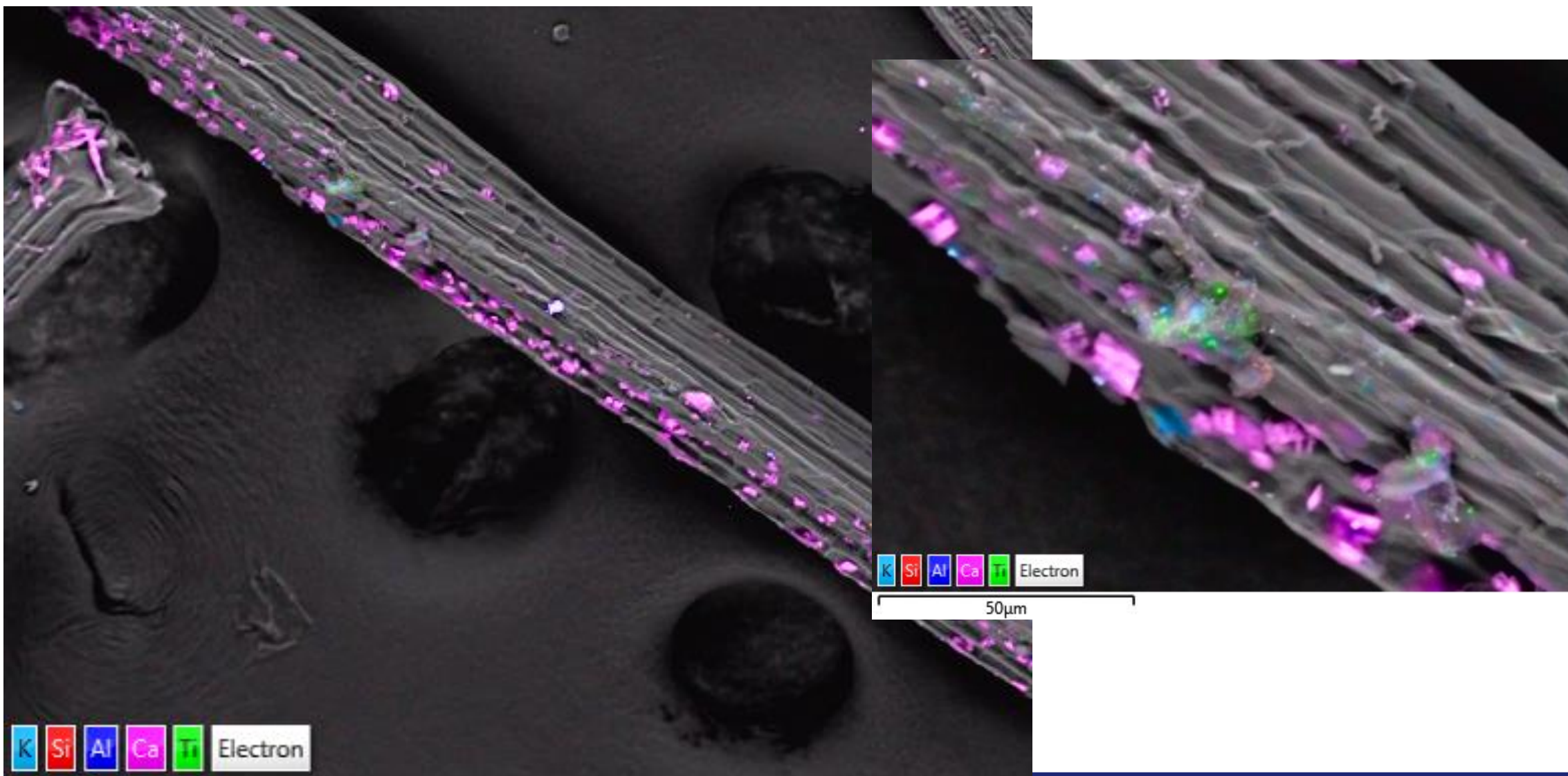


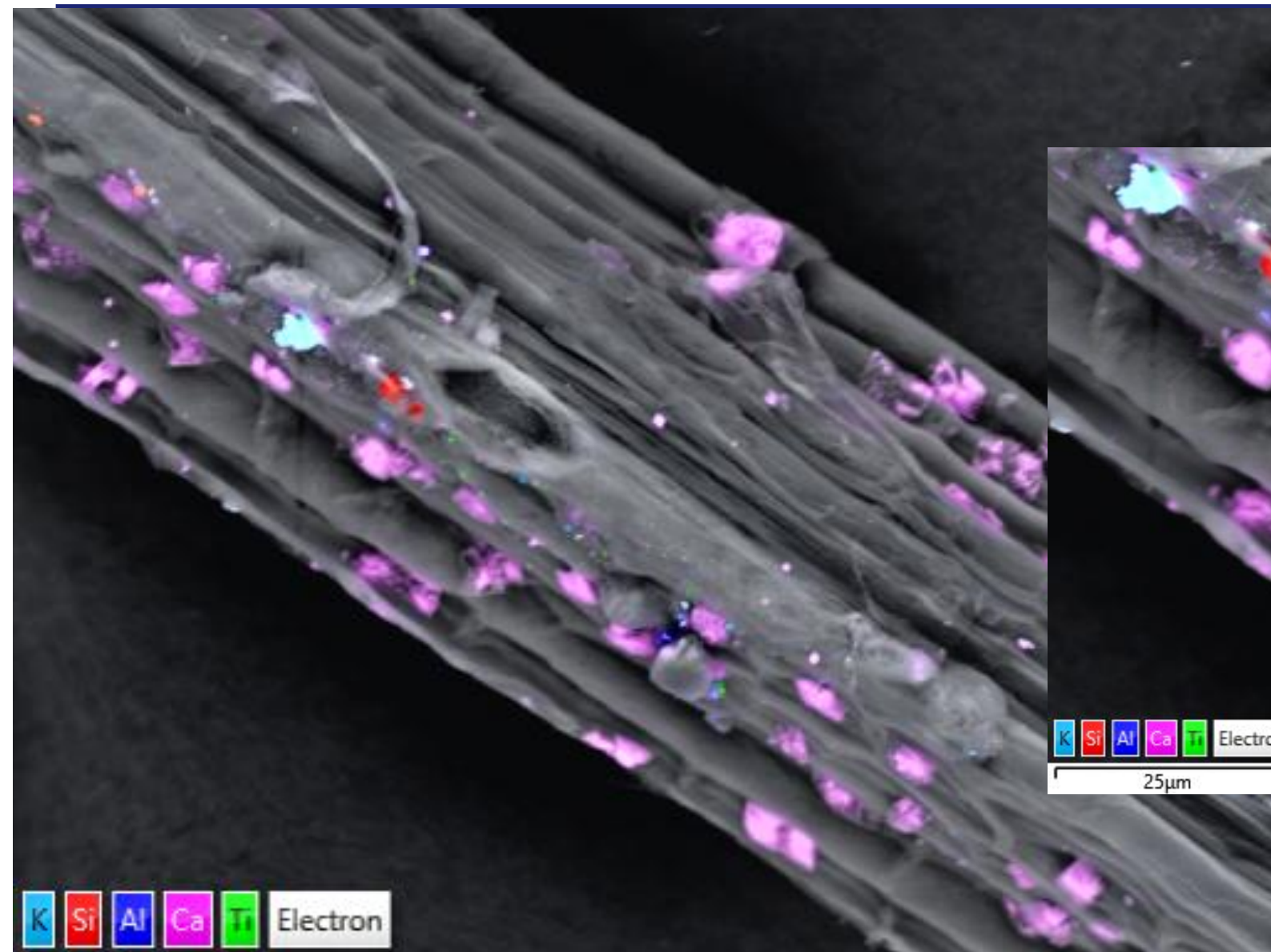


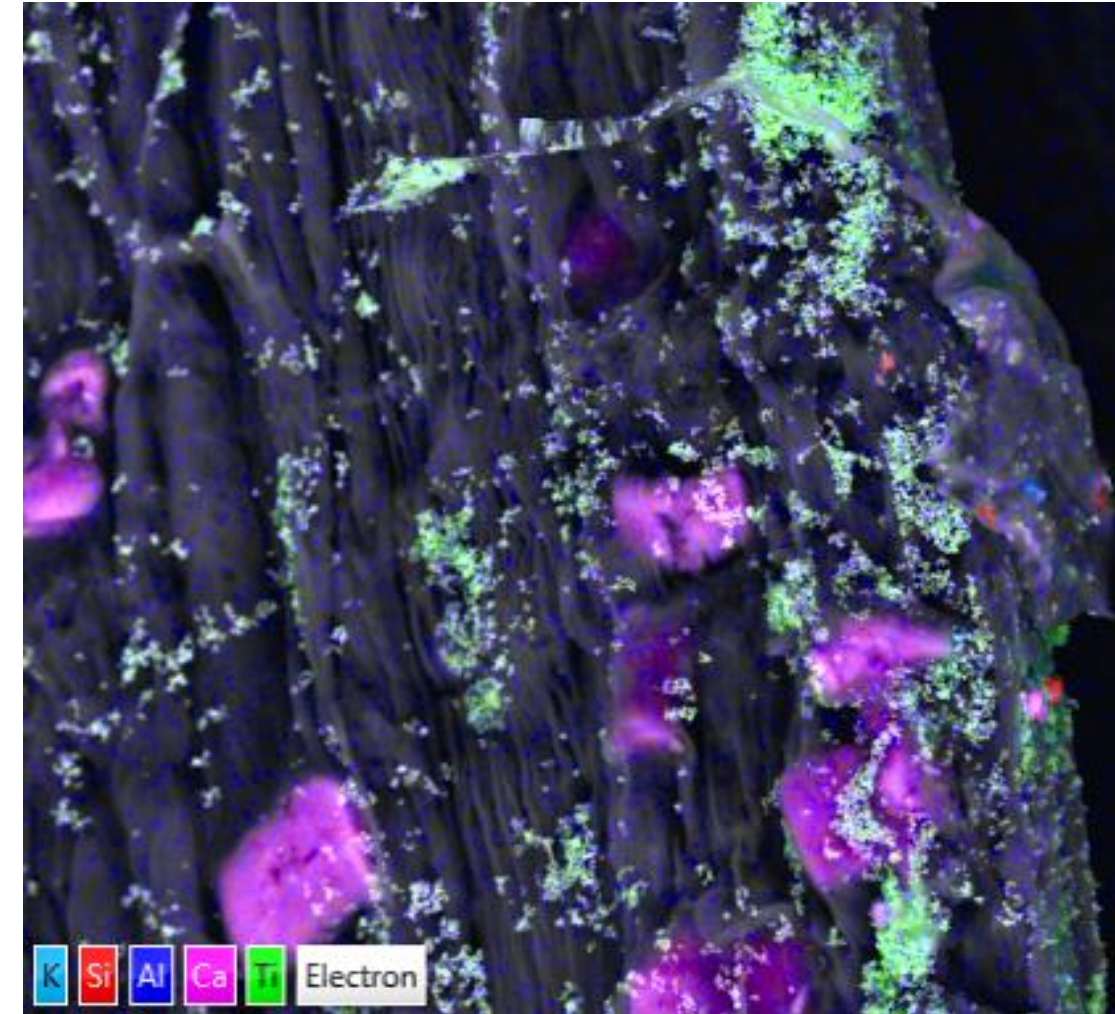
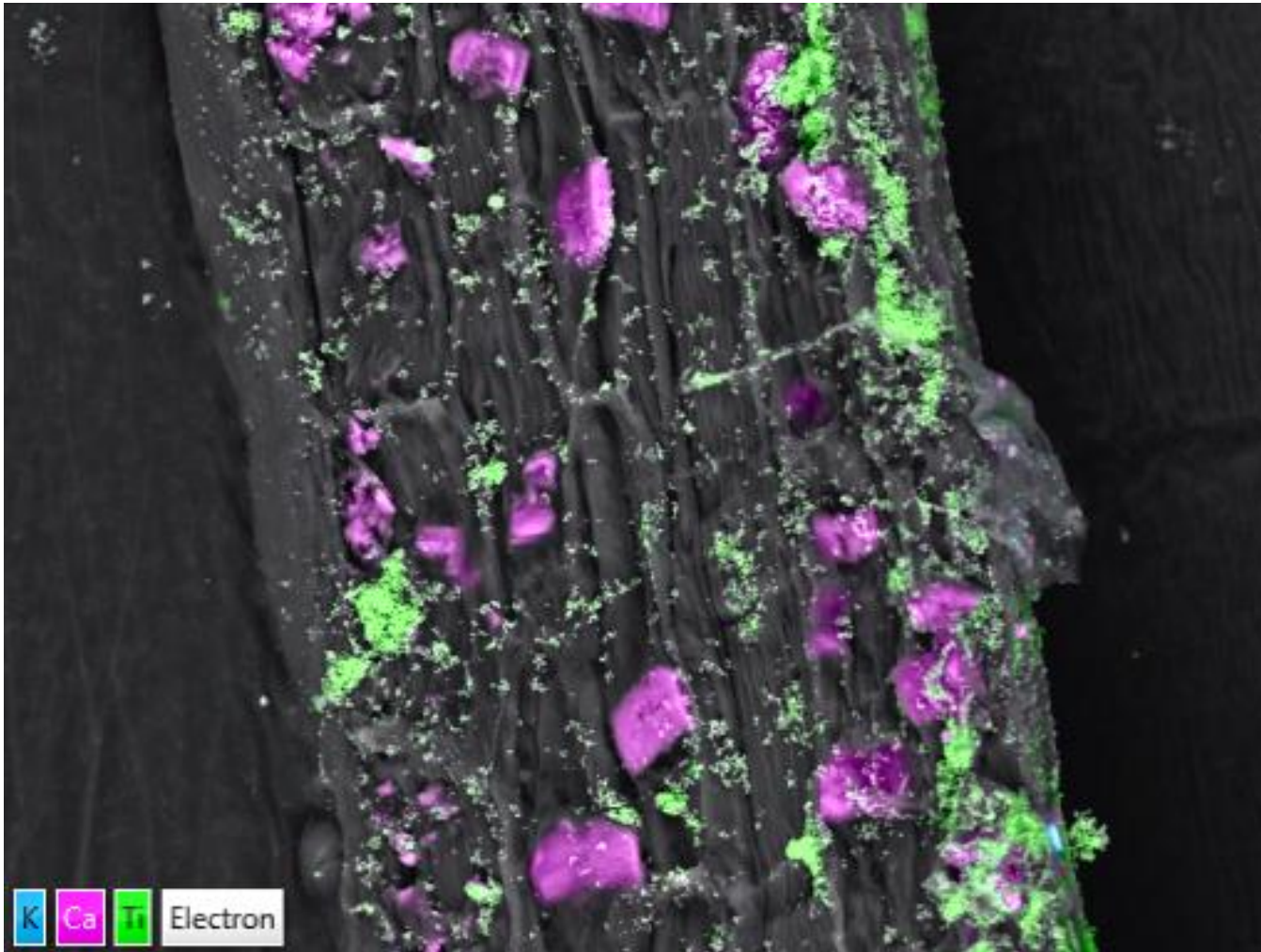
Si and Al and Ti visible, also K, Cl

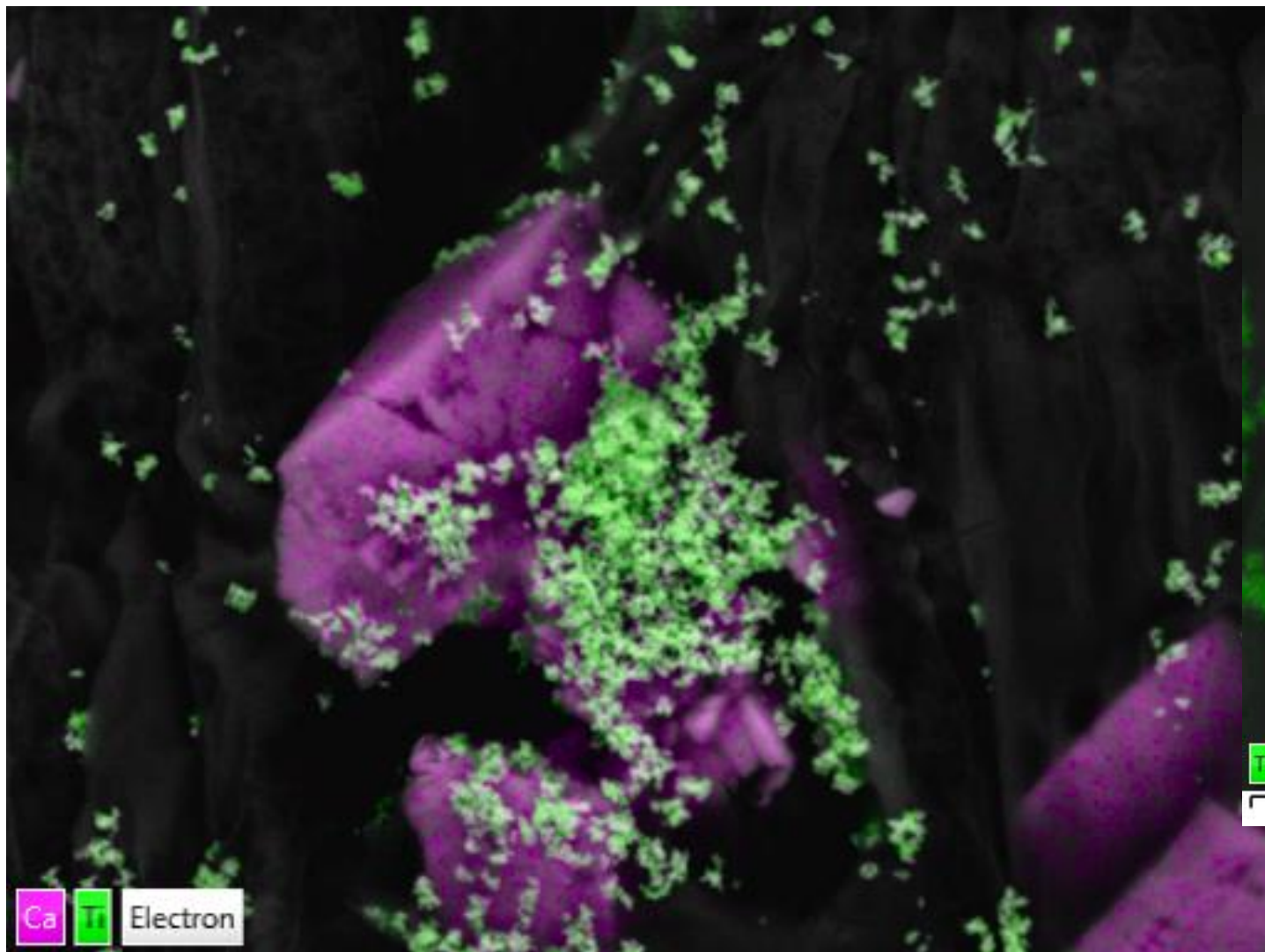




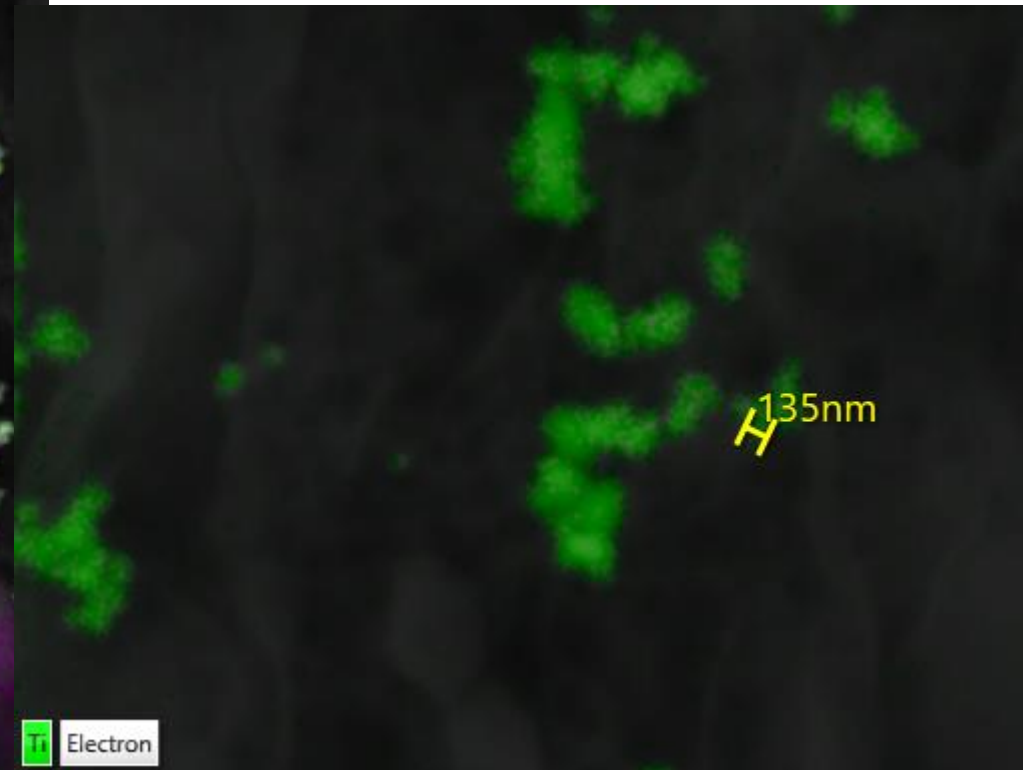


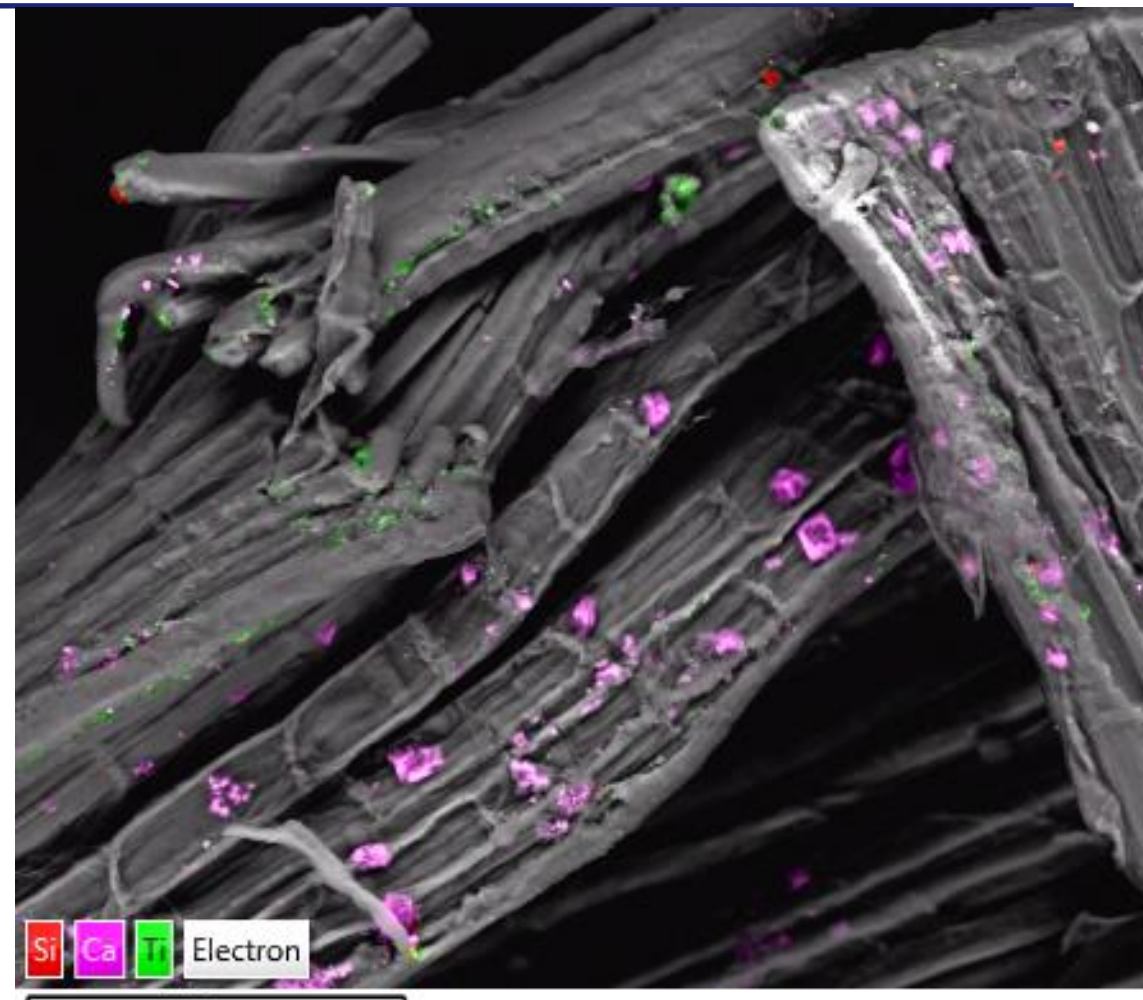
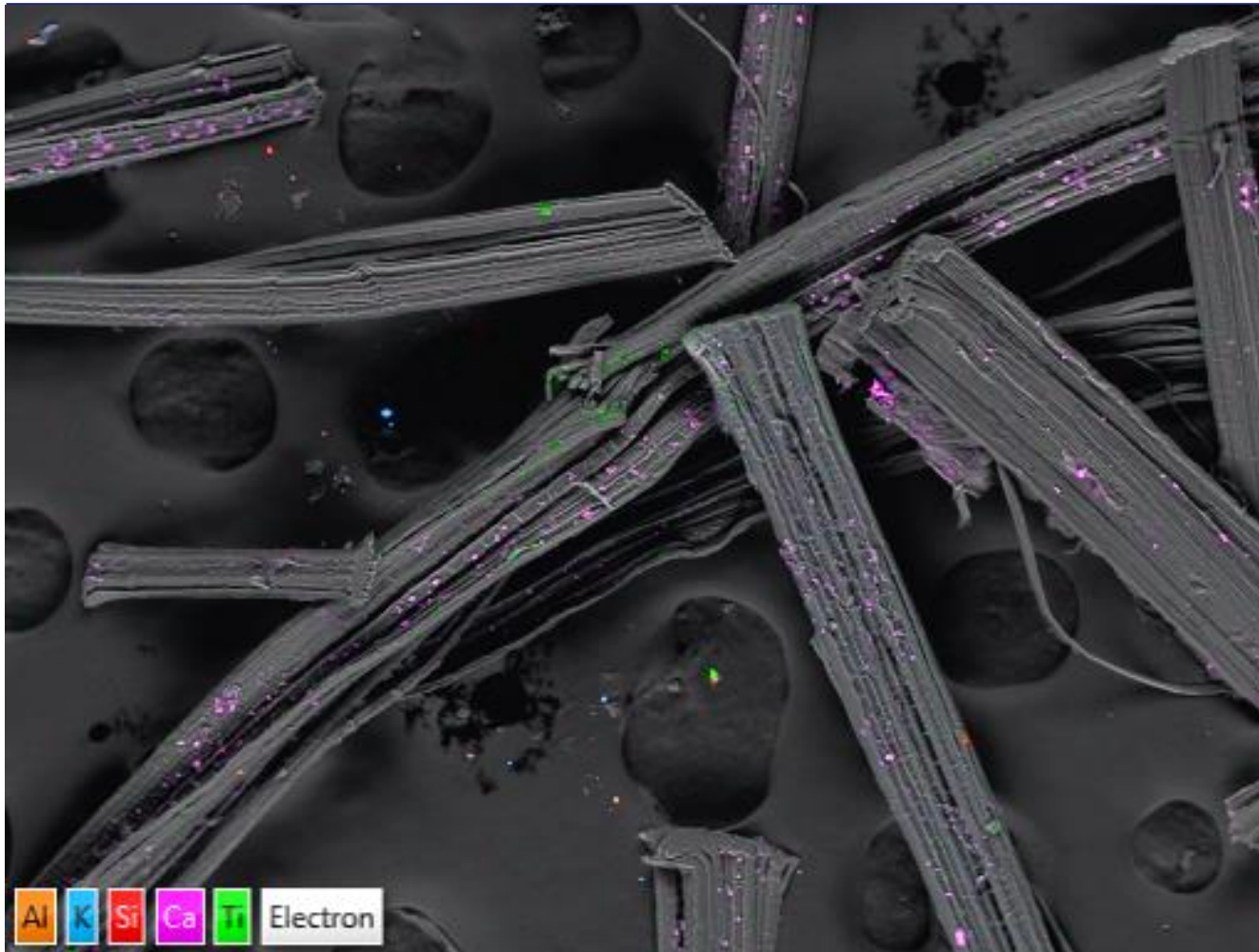






Visible Ti nanoparticles





**Thank you for your attention!**

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