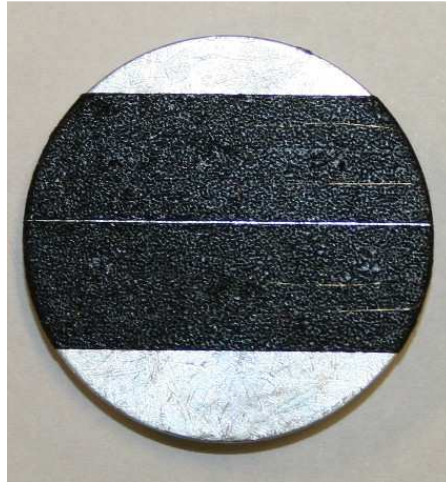


# Hall D Wire Characterization

## Samples F5-1 & F5-2

1. **Sample preparation:** ultrasonic cleaning in DI water for 45 minutes.
2. **Sample installation:** for SEM inspection wires were installed on a sample holder (diameter=36 mm) on 2 stripes of conductive carbon tape, 2 fragment of each sample per stripe (nomenclature: F5-1a, F5-1b and F5-2a, F5-2b).

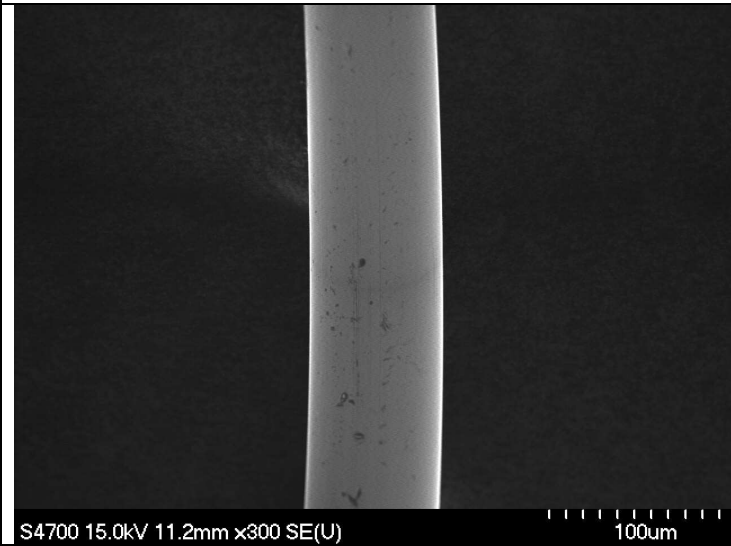
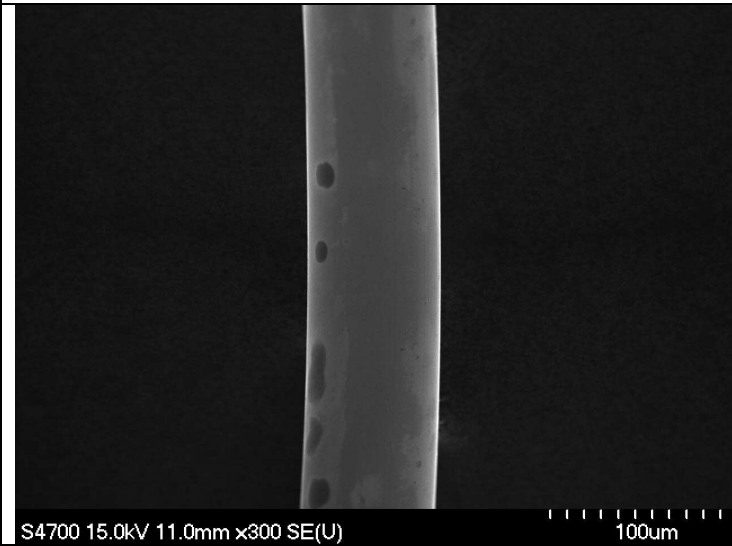
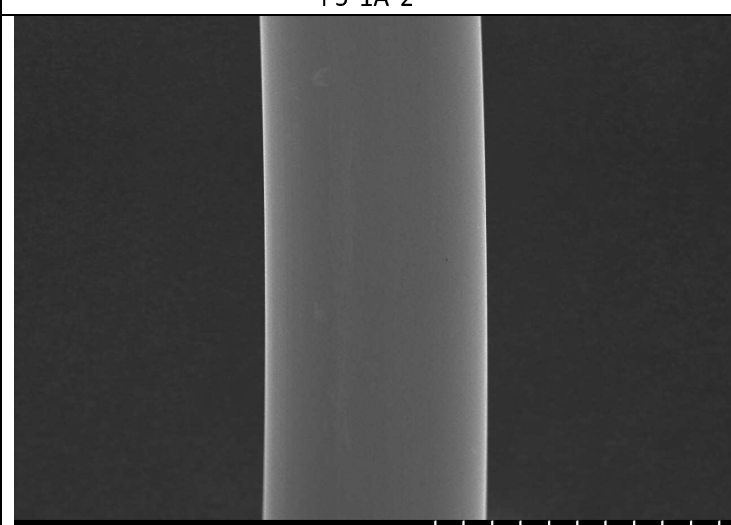
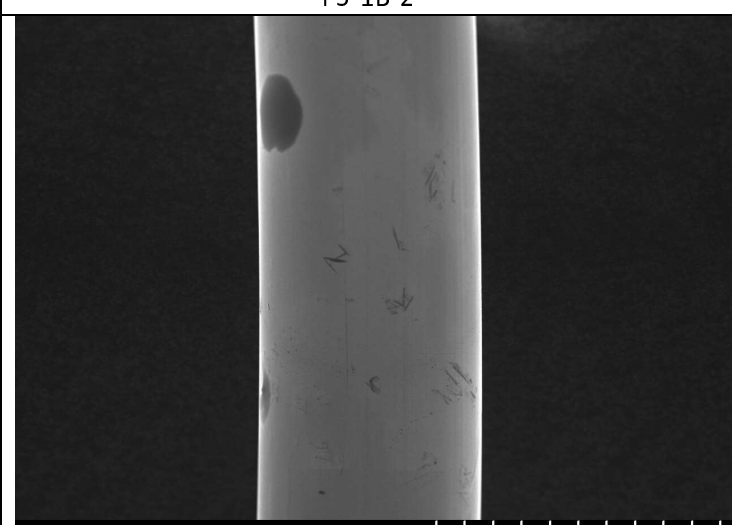


Pic1. Typical sample installation.

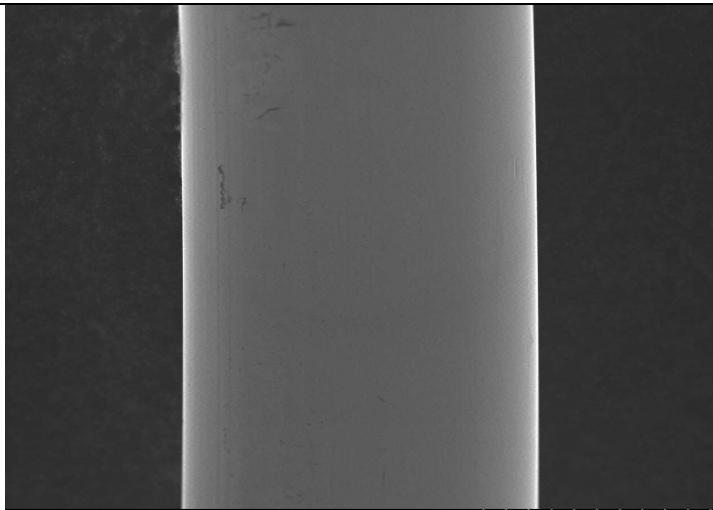
3. **Wire inspection:**
  - a) Each wire fragment was examined along its length (beginning at approximately 5mm from the sample holder edge and ending ~5mm before the opposite edge) at magnification of ~x600, at fast scan rate.
  - b) Images at designated magnifications (x300, x500, x800, x1000) were taken randomly along the sample length;
  - c) Images for the ovality measurements were taken at 1000x magnification in three points of each wire fragment: in the middle (approximately) and close to both ends;
  - d) Measurements of wire diameter, as visible on the images, were done using the Quartz PCI Image Management System, 3 measurements per image;
  - e) Additional images at various magnifications were taken at the points of interest (variations in sample topography, contaminated areas, etc.)
  - f) EDS analysis was performed on the most typical points of interest.

# Sample F5-1 A, B

## I. Images at designated magnifications

F5-1A-1	F5-1B-1
	
Magnification: 300x	Magnification: 300x
F5-1A-2	F5-1B-2
	
Magnification: 500x	Magnification: 500x

F5-1A-3

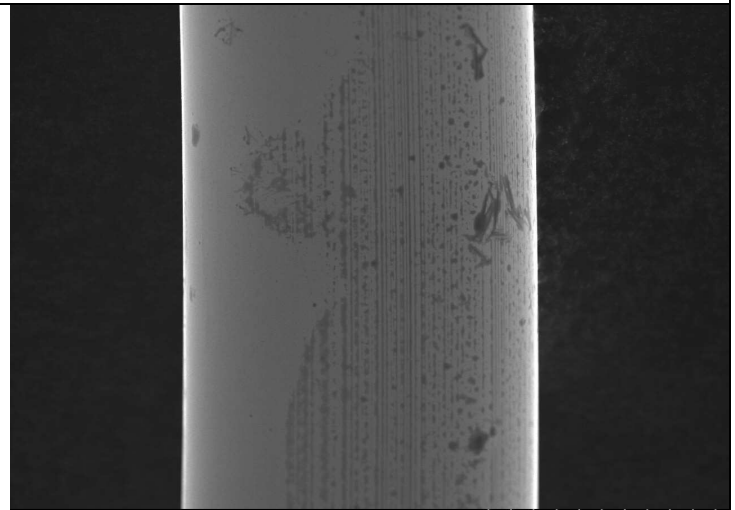


S4700 15.0kV 11.2mm x800 SE(U)

50.0um

Magnification: 800x

F5-1B-3

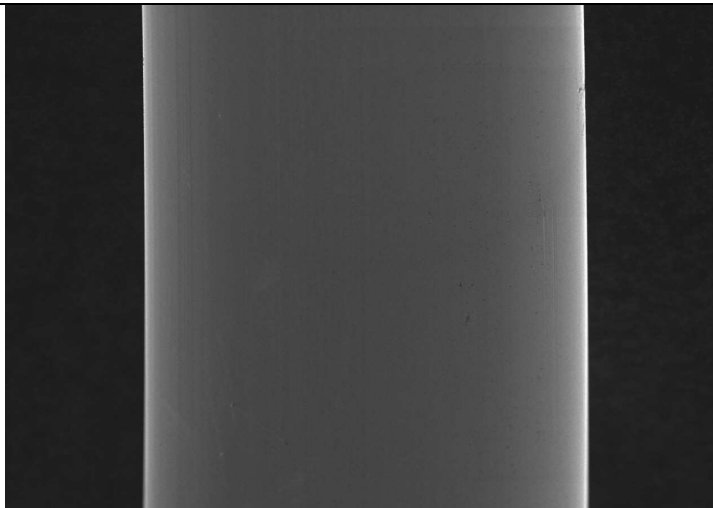


S4700 15.0kV 11.0mm x800 SE(U)

50.0um

Magnification: 800x

F5-1A-4

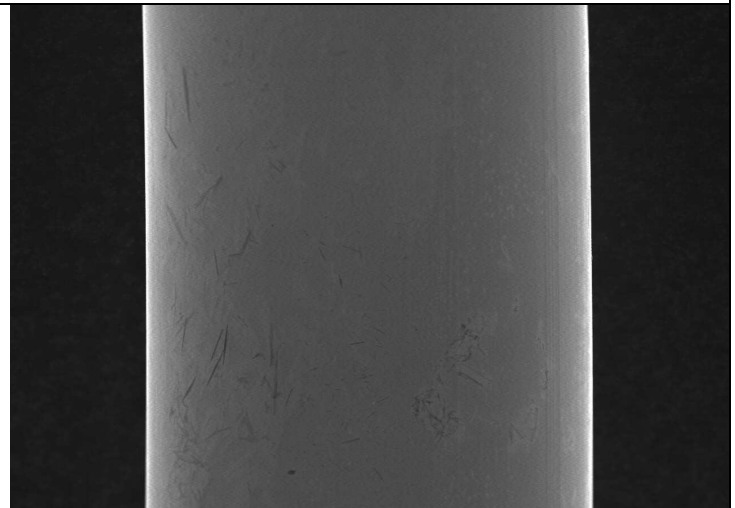


S4700 15.0kV 11.0mm x1.00k SE(U)

50.0um

Magnification: 1000x

F5-1B-4

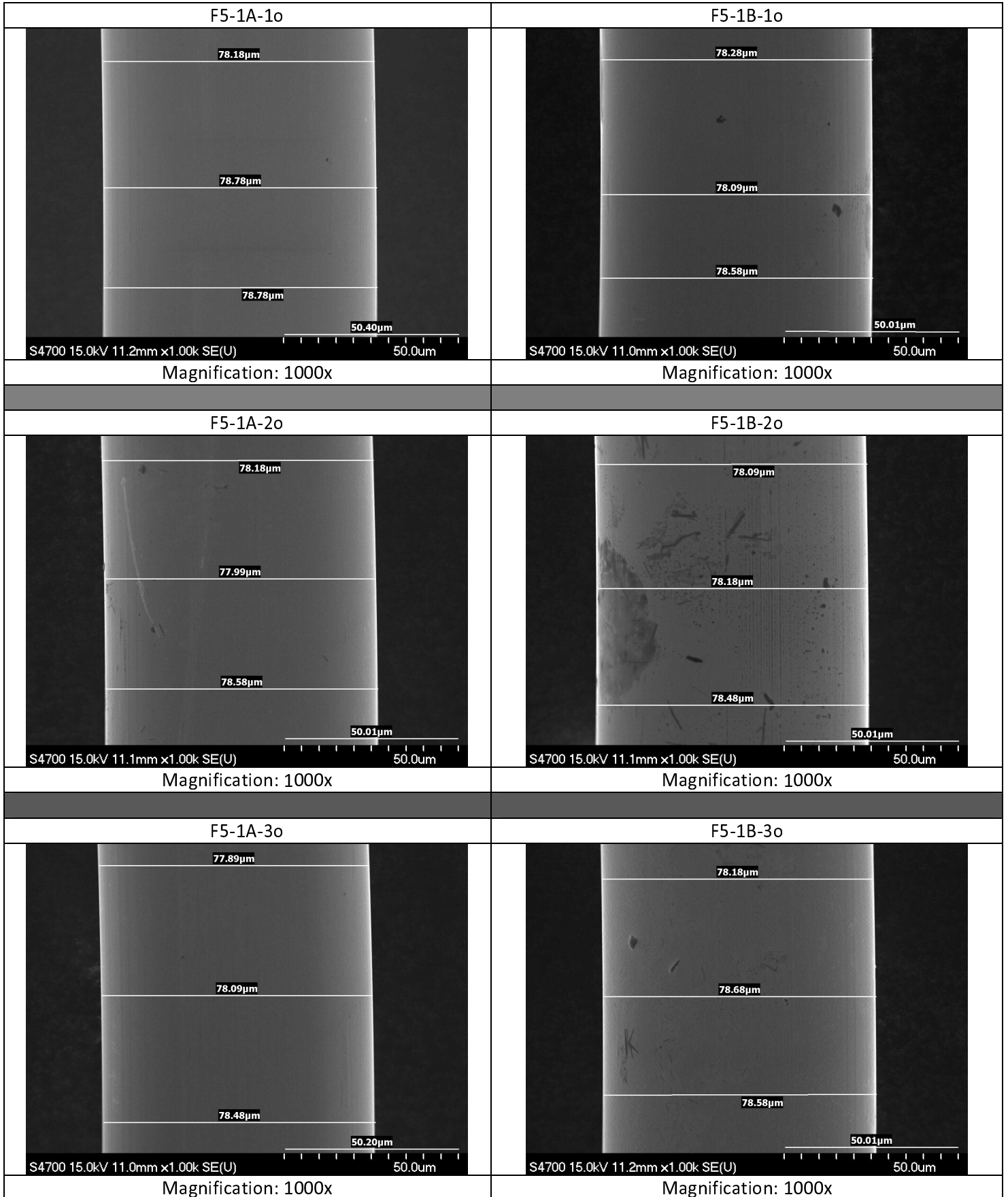


S4700 15.0kV 11.2mm x1.00k SE(U)

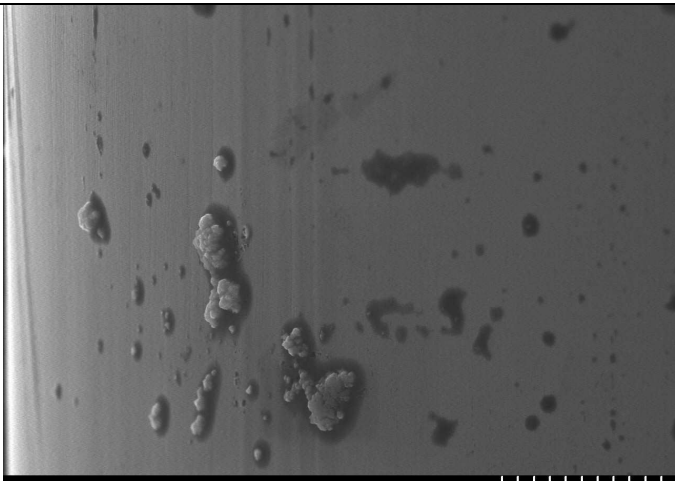
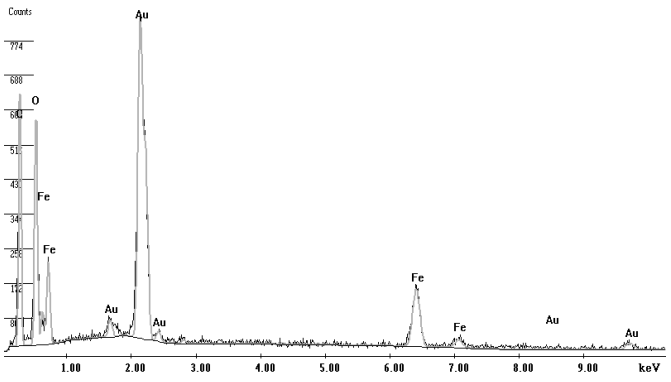
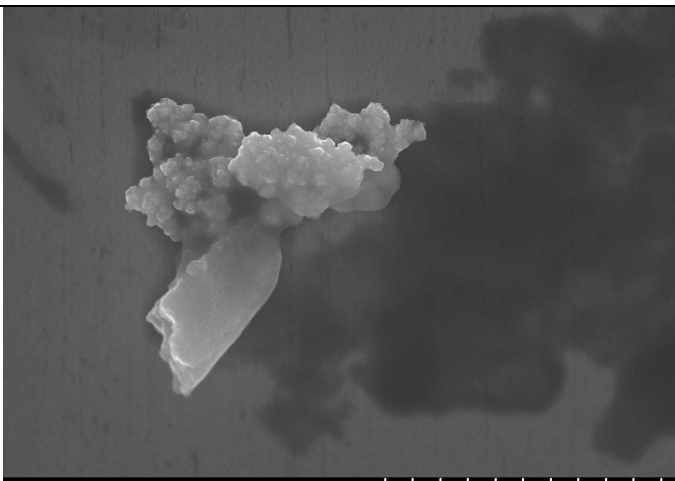
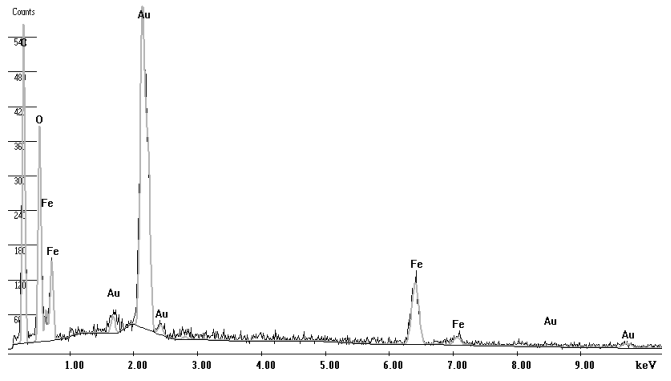
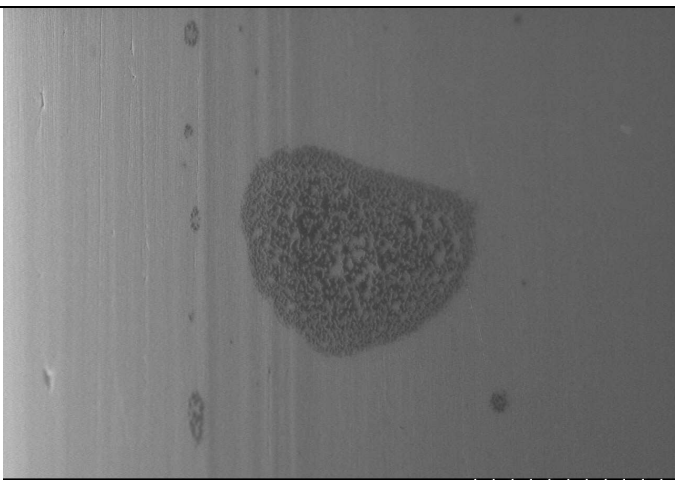
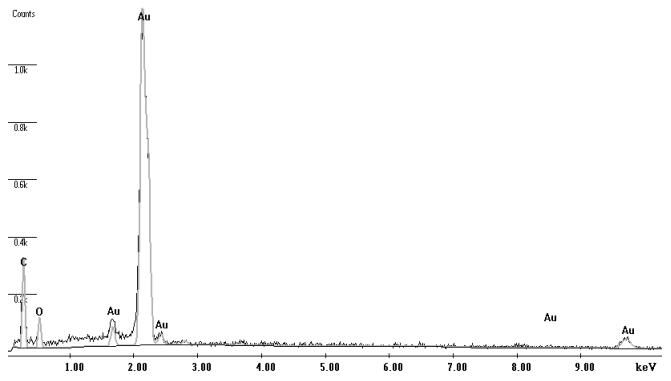
50.0um

Magnification: 1000x

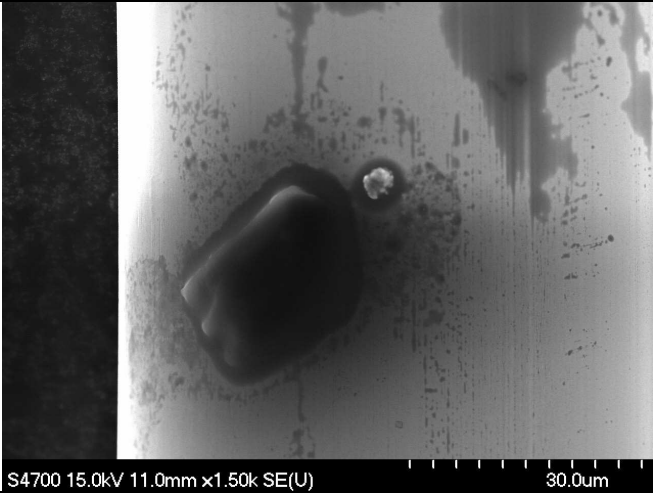
## II. Ovality Measurements



### III. Points of Interest

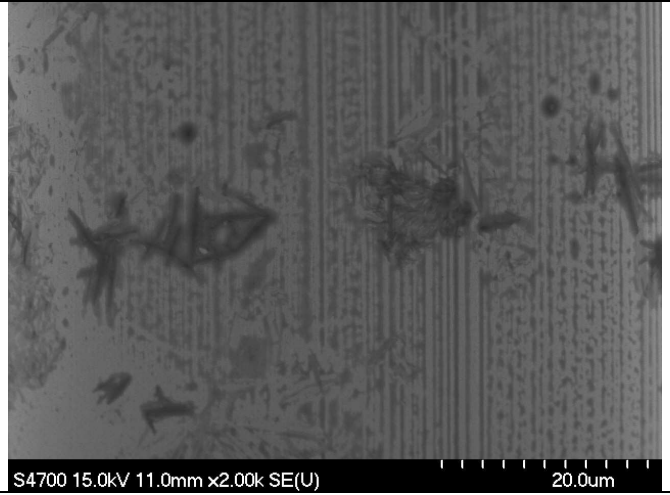
<p style="text-align: center;">F5-1A-2</p>  <p>S4700 15.0kV 11.2mm x6.01k SE(U) 5.00um</p>	<p style="text-align: center;">F5-1A-2</p> <p style="text-align: center;">C:\EDAX\Projects\OlgafortHallID\F5 1_2\F5-1A 2.spc</p> <p>Label A: spot area</p> 
<p style="text-align: center;">Magnification: 6000x</p>	<p style="text-align: center;">EDS Analysis. Surface contamination (Iron oxide?)</p>
<p style="text-align: center;">F5-1A-4</p>  <p>S4700 15.0kV 11.2mm x13.0k SE(U) 4.00um</p>	<p style="text-align: center;">F5-1A-4</p> <p style="text-align: center;">C:\EDAX\Projects\OlgafortHallID\F5 1_2\F5-1A 4.spc</p> <p>Label A: spot area</p> 
<p style="text-align: center;">Magnification: 13000x</p>	<p style="text-align: center;">EDS Analysis. Surface contamination (Iron oxide?)</p>
<p style="text-align: center;">F5-1A-7</p>  <p>S4700 15.0kV 11.2mm x7.03k SE(U) 5.00um</p>	<p style="text-align: center;">F5-1A-7</p> <p style="text-align: center;">C:\EDAX\Projects\OlgafortHallID\F5 1_2\F5-1A 7.spc</p> <p>Label A: spot area</p> 
<p style="text-align: center;">Magnification: 7000x</p>	<p style="text-align: center;">EDS Analysis. Environmental surface contamination</p>

F5-1B-3 Environmental contamination



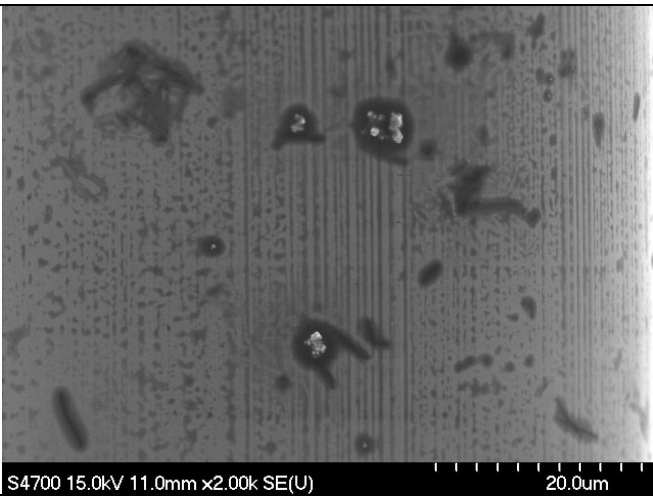
Magnification: 1500x

F5-1B-7 Environmental contamination



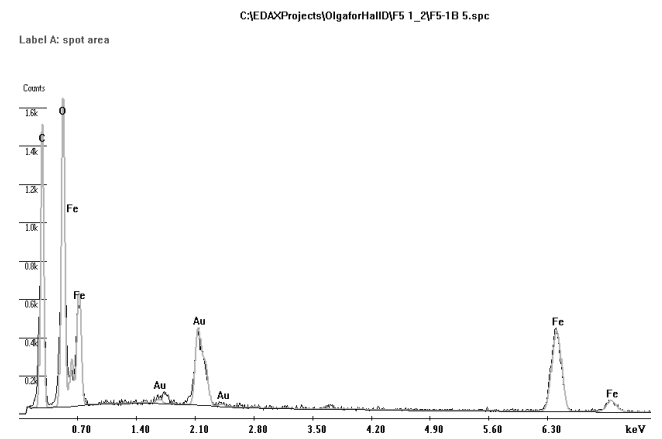
Magnification: 2000x

F5-1B-5



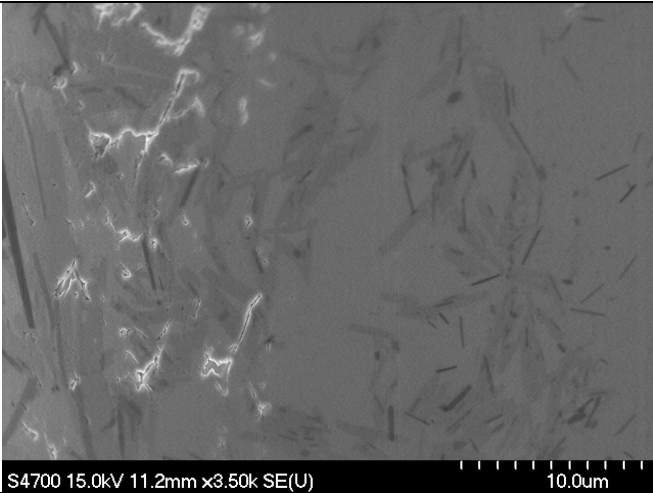
Magnification: 2000x

F5-1B-5



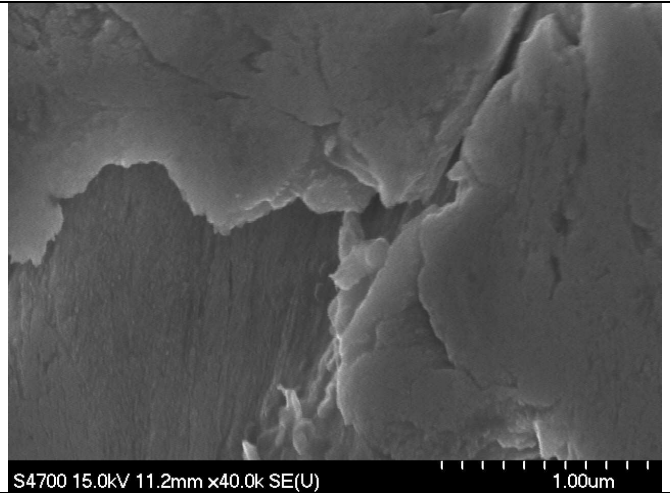
EDS Analysis. Surface contamination (Iron oxide?)

F5-1B-9 Surface damage.



Magnification: 3500x

F5-1B-10 Surface damage (magnified).

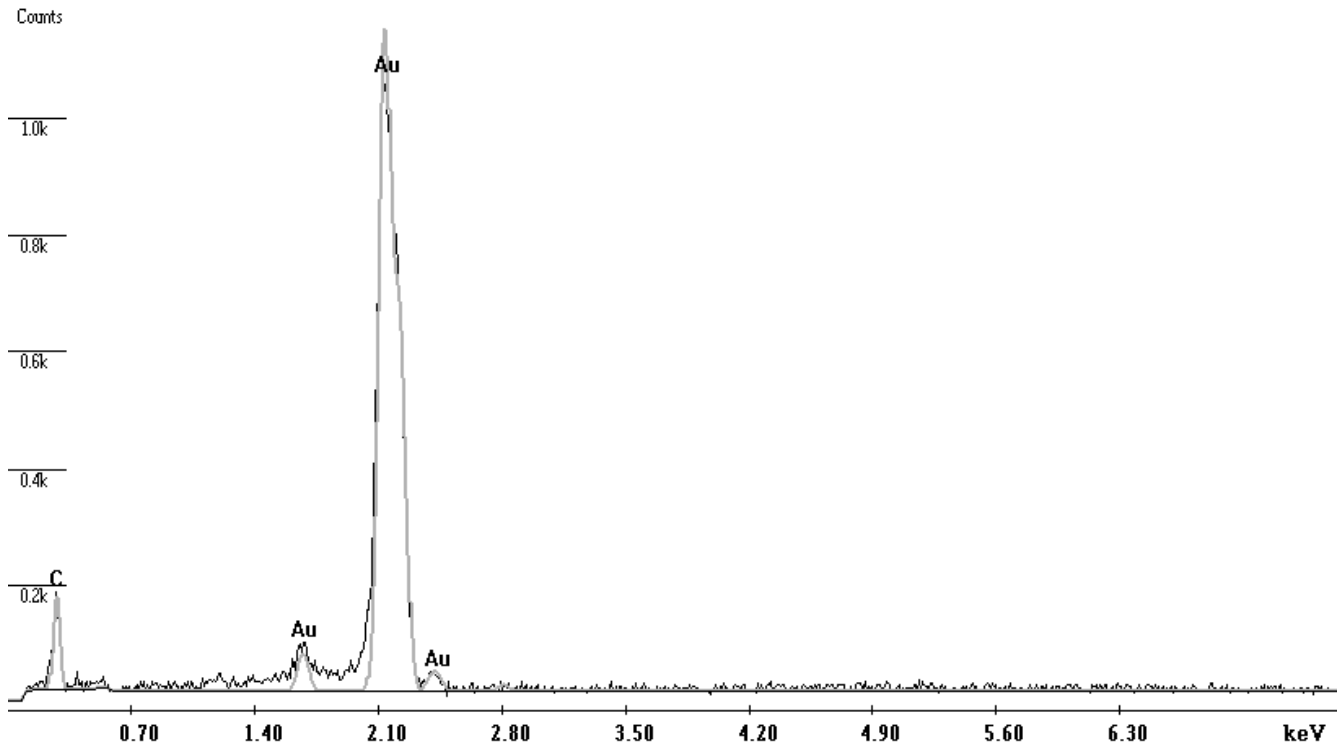


Magnification: 4000x

## EDS analysis of damaged area.

C:\EDAXProjects\OlgaforHalID\F5 1\_2\F5-1B 10.spc

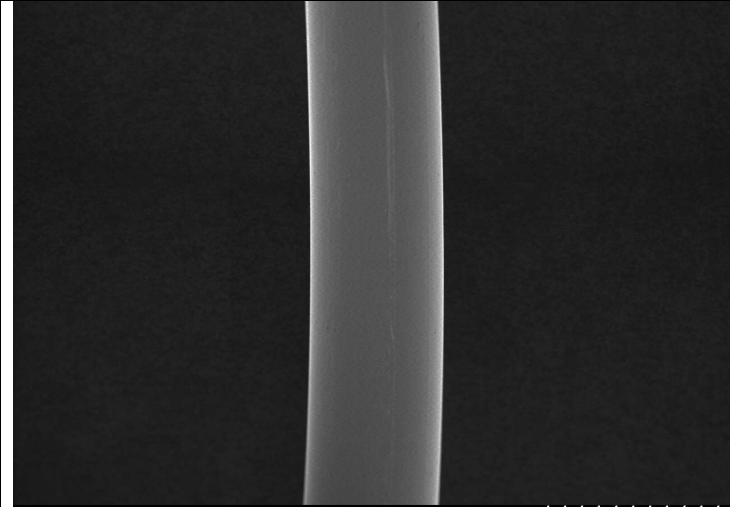
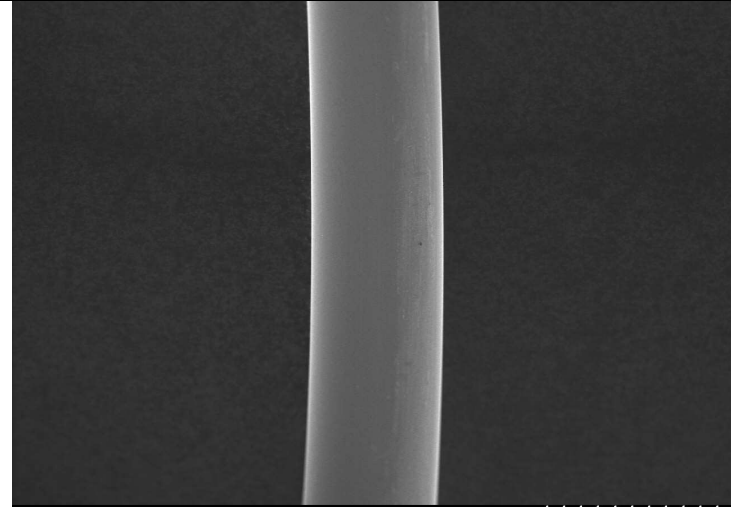
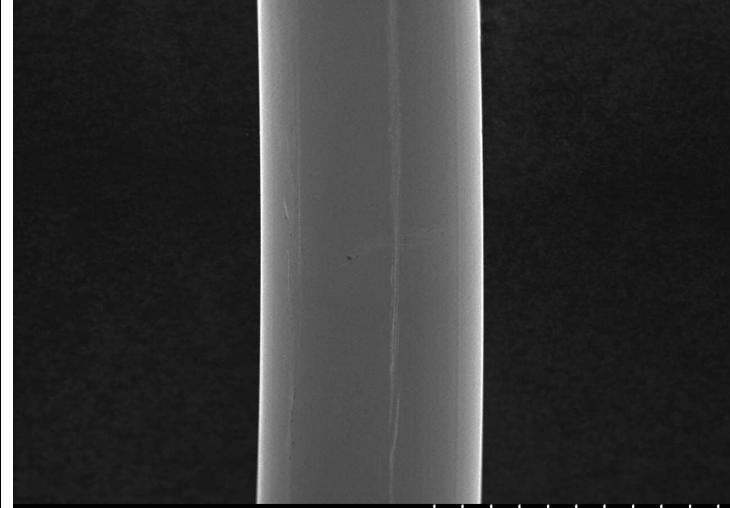
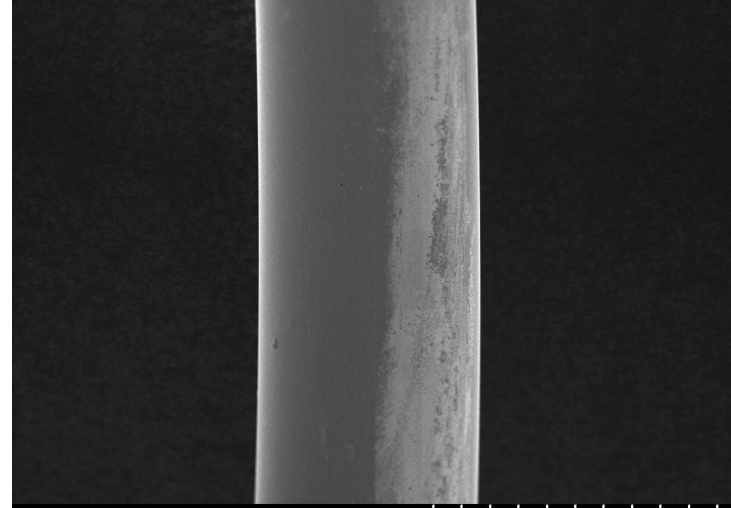
Label A: spot area



### Note:

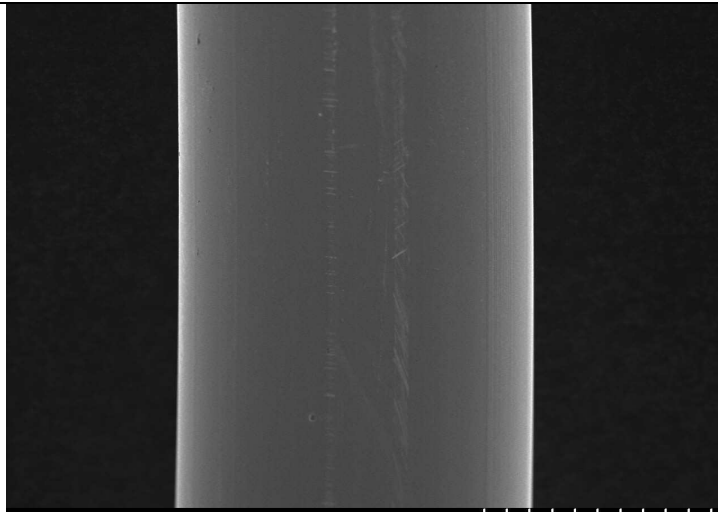
- 1) No traces of Cu within the damaged area were indicated by the EDS analysis (detection limit ~1%).
- 2) Environmental contamination as shown at pic F5-1B-7, could possibly be of bacterial origin.

**Sample F5-2 A, B**  
Images at designated magnifications

F5-2A-1	F5-2B-1
	
Magnification: 300x	Magnification: 300x
F5-2A-2	F5-2B-2
	
Magnification: 500x	Magnification: 500x



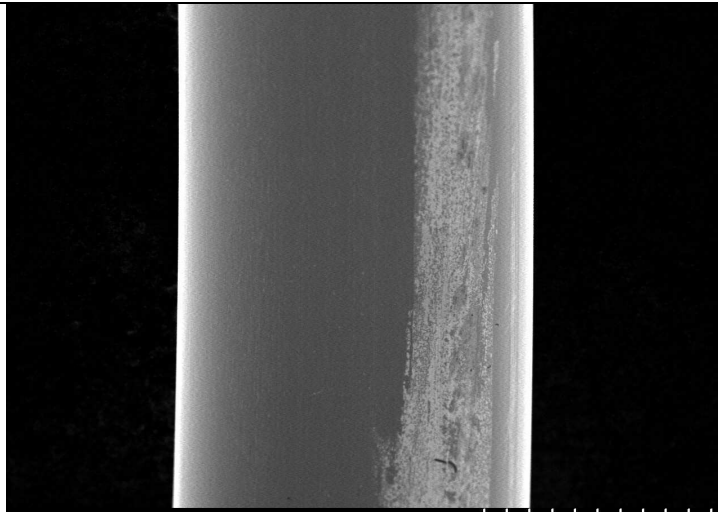
F5-2A-3



S4700 15.0kV 11.1mm x800 SE(U) 50.0um

Magnification: 800x

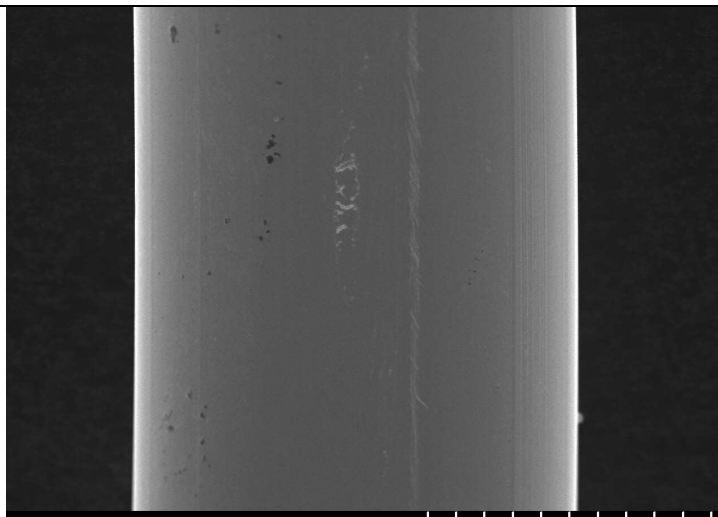
F5-2B-3



S4700 15.0kV 11.0mm x800 SE(U) 50.0um

Magnification: 800x

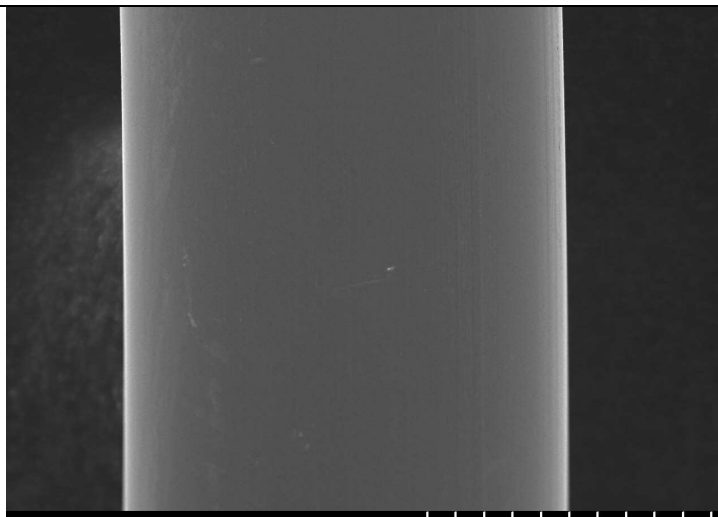
F5-2A-4



S4700 15.0kV 11.1mm x999 SE(U) 50.0um

Magnification: 1000x

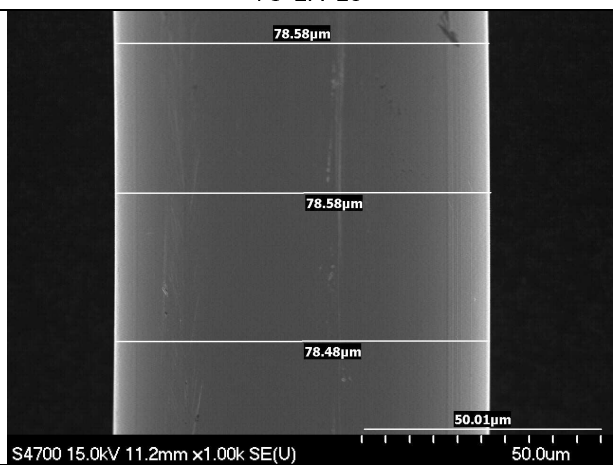
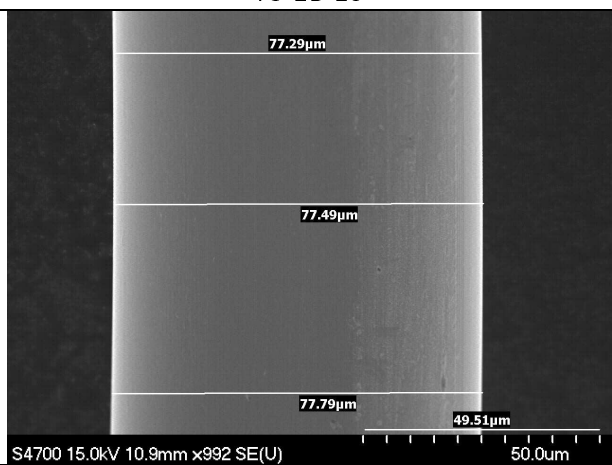
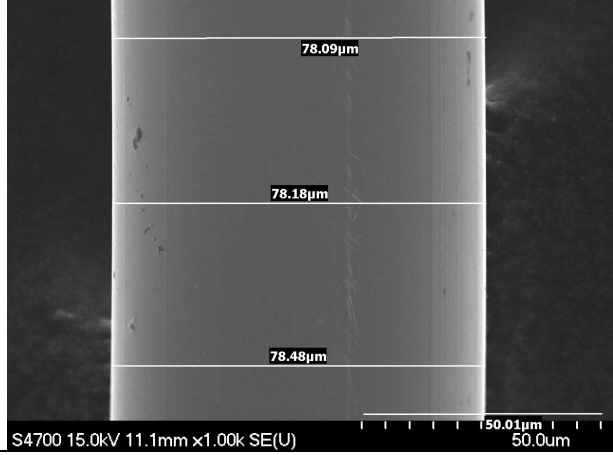
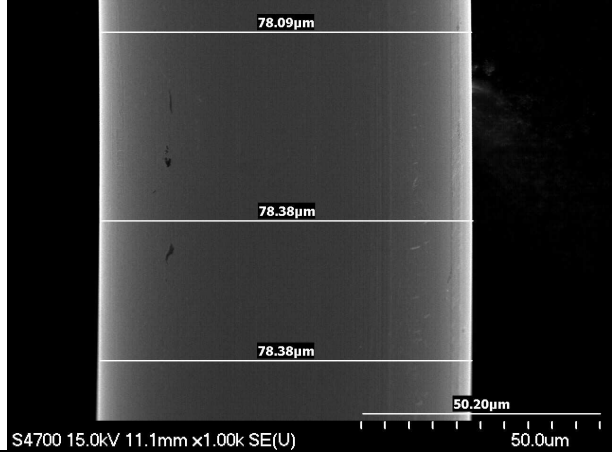
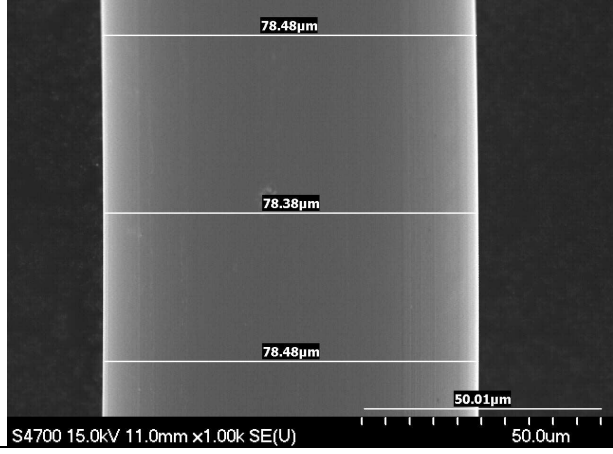
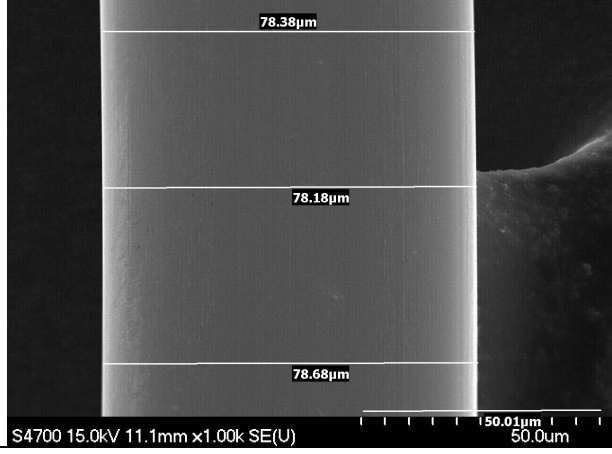
F5-2B-4



S4700 15.0kV 11.1mm x1.00k SE(U) 50.0um

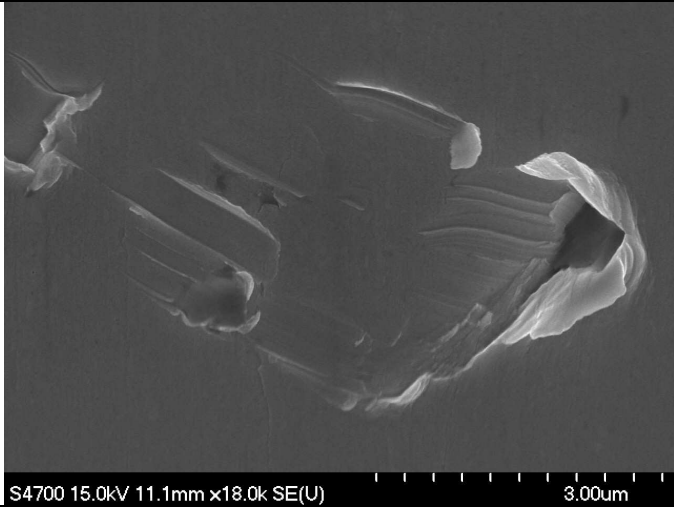
Magnification: 1000x

## II. Ovality Measurements

<p>F5-2A-1o</p>  <p>78.58µm 78.58µm 78.48µm 50.01µm S4700 15.0kV 11.2mm x1.00k SE(U) 50.0um</p>	<p>F5-2B-1o</p>  <p>77.29µm 77.49µm 77.79µm 49.51µm S4700 15.0kV 10.9mm x992 SE(U) 50.0um</p>
<p>Magnification: 1000x</p>	<p>Magnification: 1000x</p>
<p>F5-2A-2o</p>	<p>F5-2B-2o</p>
 <p>78.09µm 78.18µm 78.48µm 50.01µm S4700 15.0kV 11.1mm x1.00k SE(U) 50.0um</p>	 <p>78.09µm 78.38µm 78.38µm 50.20µm S4700 15.0kV 11.1mm x1.00k SE(U) 50.0um</p>
<p>Magnification: 1000x</p>	<p>Magnification: 1000x</p>
<p>F5-2A-3o</p>	<p>F5-2B-3o</p>
 <p>78.48µm 78.38µm 78.48µm 50.01µm S4700 15.0kV 11.0mm x1.00k SE(U) 50.0um</p>	 <p>78.38µm 78.18µm 78.68µm 50.01µm S4700 15.0kV 11.1mm x1.00k SE(U) 50.0um</p>
<p>Magnification: 1000x</p>	<p>Magnification: 1000x</p>

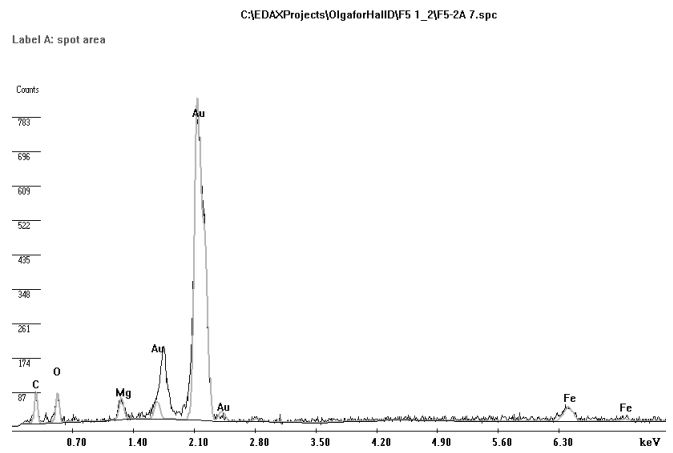
### III. Points of Interest

F5-2A-7 Surface damage.



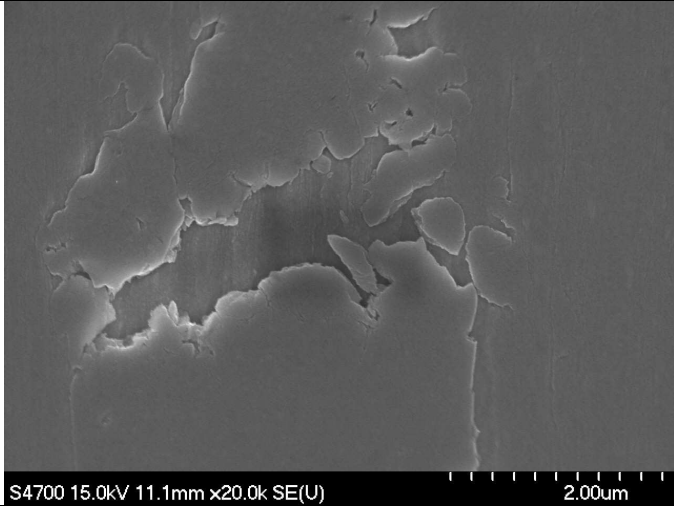
Magnification: 18000x

F5-2A-7



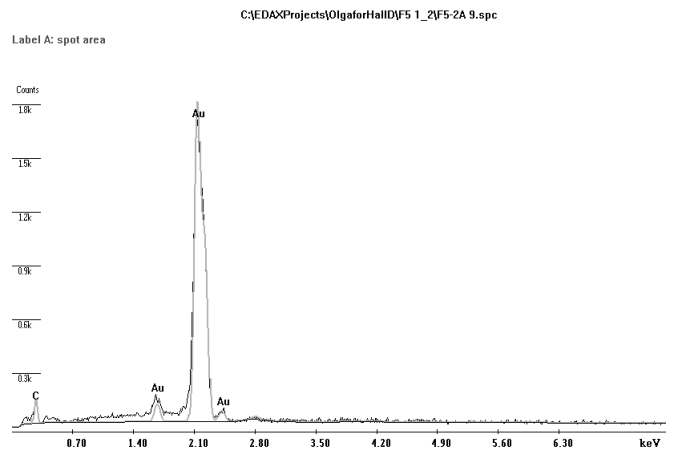
EDS Analysis. Surface damage and contamination.

F5-2A-9 Surface damage.



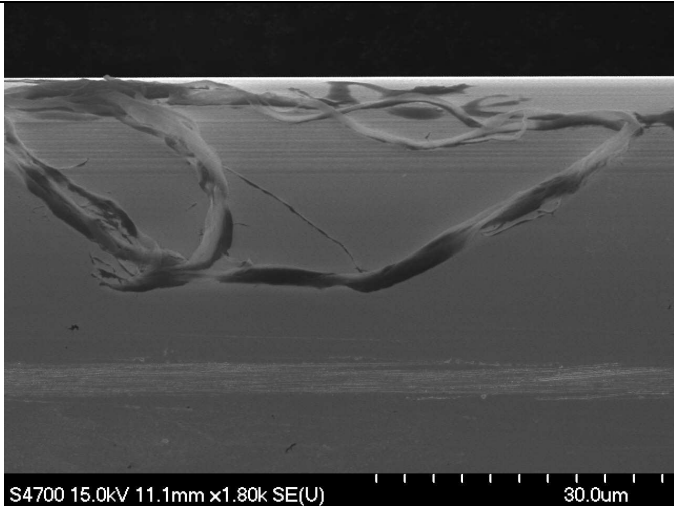
Magnification: 20000x

F5-2A-9



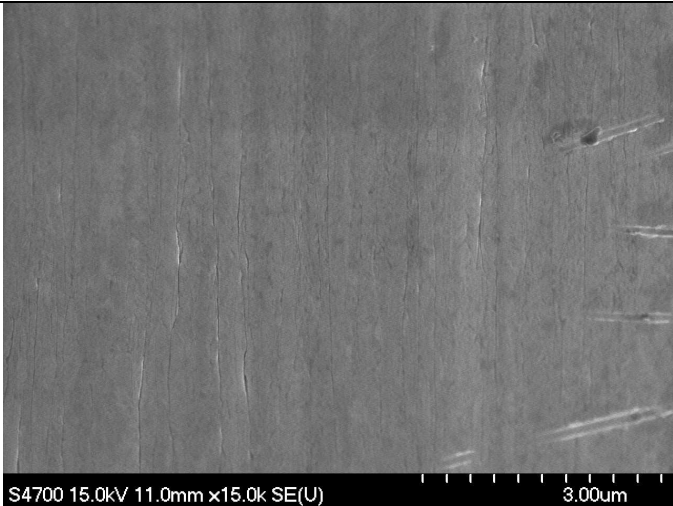
EDS Analysis. Surface damage. No Cu.

F5-2A-5 Environmental contamination.



Magnification: 25000x

F5-2B-6 Minor surface damage..



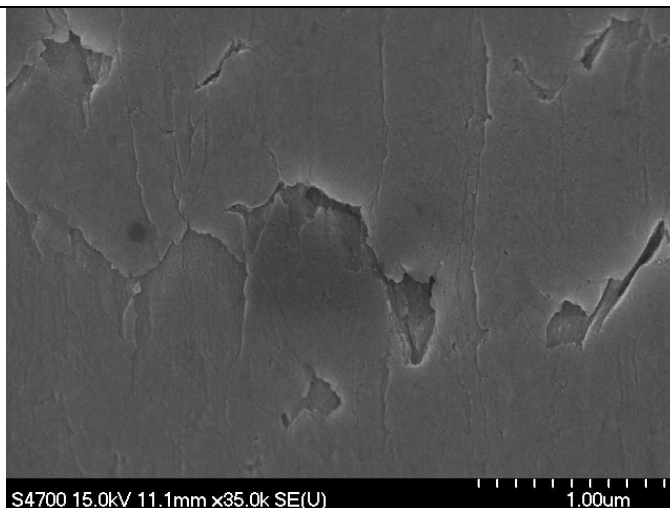
Magnification: 15000x

F5-2B-5 Surface structure.



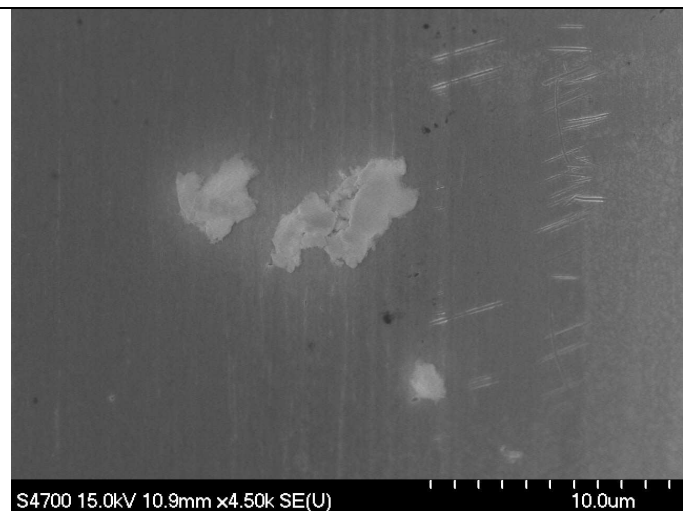
Magnification: 30000x

F5-2B-10 Details of surface structure.



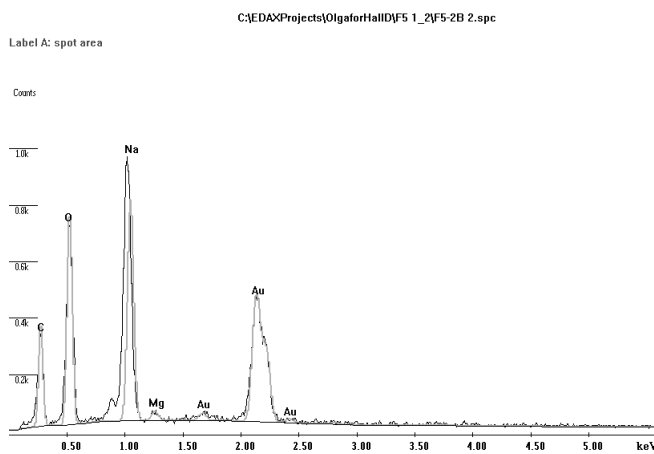
Magnification: 35000x

F5-2B-2 Surface contamination.



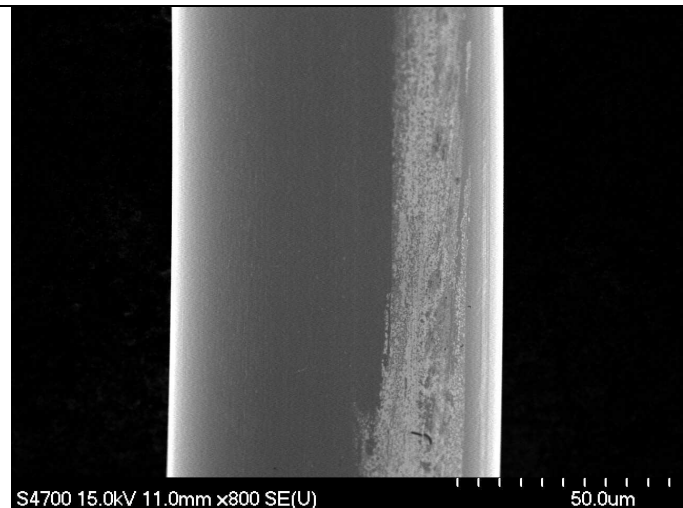
Magnification: 4500x

F5-2B-2



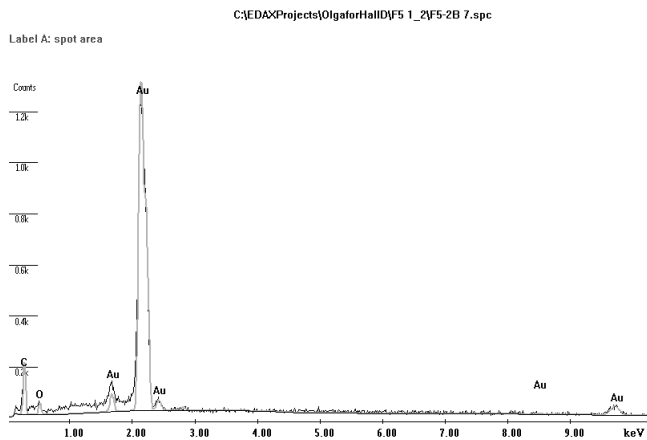
EDS Analysis. Surface contamination. (NaCl?)

F5-2B-7 Surface contamination.



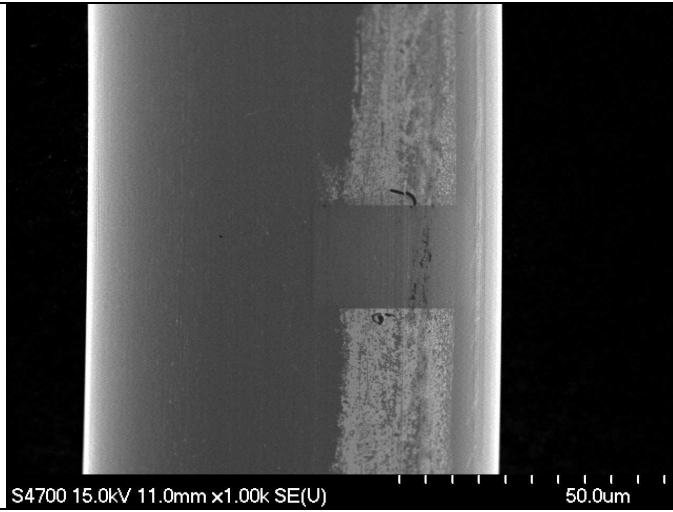
Magnification: 800x

F5-2B-7



EDS Analysis. Surface contamination. Environmental.

F5-2B-8 After EDS analysis.



Magnification: 1000x

Comment on F5-2B-8:

Electron beam eliminated contamination layer o the spot of exposure during the EDS analysis.