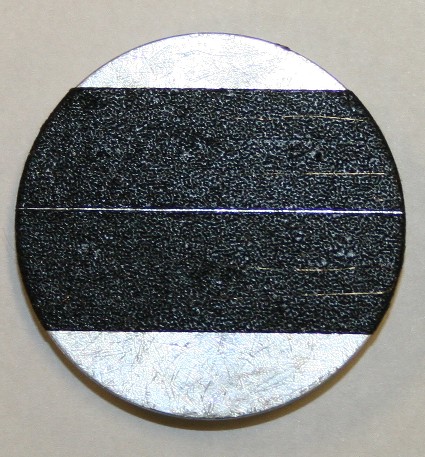
Hall D Wire Characterization

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.

1. **Wire inspection:**
2. 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.
3. Images at designated magnifications (x300, x500, x800, x1000) were taken randomly along the sample length;
4. 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;
5. Measurements of wire diameter, as visible on the images, were done using the Quartz PCI Image Management System, 3 measurements per image;
6. Additional images at various magnifications were taken at the points of interest (variations in sample topography, contaminated areas, etc.)
7. 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 |
| F2-1a x300 1_q00.jpg | F5-1b x300 1_q00.jpg |
| Magnification: 300x | Magnification: 300x |
|  |  |
|  |  |
|  |  |
| F5-1A-2 | F5-1B-2 |
| F2-1a x500 5_q00.jpg | F5-1b x500 4_q00.jpg |
| Magnification: 500x | Magnification: 500x |
|  |  |
|  |  |

|  |  |
| --- | --- |
| F5-1A-3 | F5-1B-3 |
| F2-1a x800 3_q00.jpg | F5-1b x800 6_q00.jpg |
| Magnification: 800x | Magnification: 800x |
|  |  |
|  |  |
|  |  |
| F5-1A-4 | F5-1B-4 |
| F2-1a x1000 10_q00.jpg | F5-1b x1000 12_q00.jpg |
| Magnification: 1000x | Magnification: 1000x |
|  |  |

II. Ovality Measurements

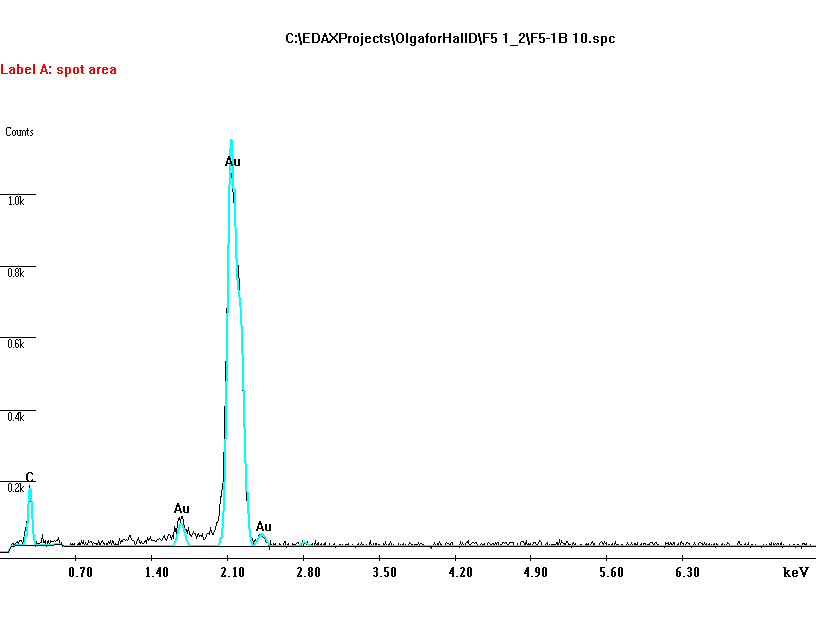
|  |  |
| --- | --- |
| F5-1A-1o | F5-1B-1o |
| F2-1a x1000 1o.JPG | F5-1b x1000 1o.JPG |
| Magnification: 1000x | Magnification: 1000x |
|  |  |
| F5-1A-2o | F5-1B-2o |
| F2-1a x1000 2o.JPG | F5-1b x1000 2o.JPG |
| Magnification: 1000x | Magnification: 1000x |
|  |  |
| F5-1A-3o | F5-1B-3o |
| F2-1a x1000 3o_q00.JPG | F5-1b x1000 3o.JPG |
| Magnification: 1000x | Magnification: 1000x |

III. Points of Interest

|  |  |
| --- | --- |
| F5-1A-2 | F5-1A-2 |
| F2-1a x6010 2_q00.jpg | F5-1A 2.bmp |
| Magnification: 6000x | EDS Analysis. Surface contamination (Iron oxide?) |
|  |  |
| F5-1A-4 | F5-1A-4 |
| F2-1a x13000 4_q00.jpg | F5-1A 4.bmp |
| Magnification: 13000x | EDS Analysis. Surface contamination (Iron oxide?) |
|  |  |
| F5-1A-7 | F5-1A-7 |
| F2-1a x7030 7_q00.jpg | F5-1A 7.bmp |
| Magnification: 7000x | EDS Analysis. Environmental surface contamination |

|  |  |
| --- | --- |
| F5-1B-3 Environmental contamination | F5-1B-7 Environmental contamination |
| F5-1b x1500 3_q00.jpg | F5-1b x2000 7_q00.jpg |
| Magnification: 1500x | Magnification: 2000x |
|  |  |
| F5-1B-5 | F5-1B-5 |
| F5-1b x2000 5_q00.jpg | F5-1B 5.bmp |
| Magnification: 2000x | EDS Analysis. Surface contamination (Iron oxide?) |
|  |  |
| F5-1B-9 Surface damage. | F5-1B-10 Surface damage (magnified). |
| F5-1b x3500 9_q00.jpg | F5-1b x40000 10_q00.jpg |
| Magnification: 3500x | Magnification: 4000x |
|  |  |

EDS analysis of damaged 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 |
| F5-2a x300 1_q00.jpg | F5-2b x300 1_q00.jpg |
| Magnification: 300x | Magnification: 300x |
|  |  |
|  |  |
|  |  |
| F5-2A-2 | F5-2B-2 |
| F5-2a x500 4_q00.jpg | F5-2b x500 4_q00.jpg |
| Magnification: 500x | Magnification: 500x |
|  |  |
|  |  |

|  |  |
| --- | --- |
| F5-2A-3 | F5-2B-3 |
| F5-2a x800 6_q00.jpg | F5-2b x800 7_q00.jpg |
| Magnification: 800x | Magnification: 800x |
|  |  |
|  |  |
|  |  |
| F5-2A-4 | F5-2B-4 |
| F5-2a x1000 8_q00.jpg | F5-2b x1000 12_q00.jpg |
| Magnification: 1000x | Magnification: 1000x |
|  |  |
|  |  |

II. Ovality Measurements

|  |  |
| --- | --- |
| F5-2A-1o | F5-2B-1o |
| F5-2a x1000 1o.JPG | F5-2b x1000 1o.JPG |
| Magnification: 1000x | Magnification: 1000x |
|  |  |
| F5-2A-2o | F5-2B-2o |
| F5-2a x1000 2o.JPG | F5-2b x1000 2o.JPG |
| Magnification: 1000x | Magnification: 1000x |
|  |  |
| F5-2A-3o | F5-2B-3o |
| F5-2a x1000 3o.JPG | F5-2b x1000 3o.JPG |
| Magnification: 1000x | Magnification: 1000x |

III. Points of Interest

|  |  |
| --- | --- |
| F5-2A-7 Surface damage. | F5-2A-7 |
| F5-2a x40000 7_q00.jpg | F5-2A 7.bmp |
| Magnification: 18000x | EDS Analysis. Surface damage and contamination. |
|  |  |
| F5-2A-9 Surface damage. | F5-2A-9 |
| F5-2a x20000 9_q00.jpg | F5-2A 9.bmp |
| Magnification: 20000x | EDS Analysis. Surface damage. No Cu. |
|  |  |
| F5-2A-5 Environmental contamination. | F5-2B-6 Minor surface damage.. |
| F5-2a x1800 5_q00.jpg | F5-2b x15000 6_q00.jpg |
| Magnification: 25000x | Magnification: 15000x |

|  |  |
| --- | --- |
| F5-2B-5 Surface structure. | F5-2B-10 Details of surface structure. |
| F5-2b x30000 5_q00.jpg | F5-2b x35000 10_q00.jpg |
| Magnification: 30000x | Magnification: 35000x |
|  |  |
| F5-2B-2 Surface contamination. | F5-2B-2 |
| F5-2b x4500 2_q00.jpg | F5-2B 2.bmp |
| Magnification: 4500x | EDS Analysis. Surface contamination. (NaCl?) |
|  |  |
| F5-2B-7 Surface contamination. | F5-2B-7 |
| F5-2b x800 7_q00.jpg | F5-2B 7.bmp |
| Magnification: 800x | EDS Analysis. Surface contamination. Environmental. |

|  |  |
| --- | --- |
| F5-2B-8 After EDS analysis. |  |
| F5-2b x1000 8_q00.jpg | Comment on F5-2B-8:  Electron beam eliminated contamination layer o the spot of exposure during the EDS analysis. |
| Magnification: 1000x |  |