# Electronic Supplementary Information

# First Report on SILAR Deposited Nanostructured Uranyl Sulphide Thin Films and Its Chemical Conversion to Silver Sulphide

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# Supporting Information, S1

# Solubility Study for $UO_2S$ and $Ag_2S$ thin films

## Experimental

Initially $UO_2S$ and $Ag_2S$ thin films were kept is 50 mL of double distilled water separately and then absorbance spectra for these thin films were recorded after specific time intervals as 0, 30 and 60 minutes. Then decrease in absorbance at particular wavelength (for $UO_2S$, wavelength was 445 nm and for $Ag_2S$, wavelength was 375 nm). Percent removal of respective material with respect to time has been tabulated below,

| **$UO_2S$ thin film** | | |
|---|---|---|
| **Time (Min)** | **Absorbance at 445 nm** | **% Removal** |
| 0 | 0.512 | 0 |
| 30 | 0.324 | 36.7 |
| 60 | 0.278 | 45.7 |
| **$Ag_2S$ thin film** | | |
| **Time (Min)** | **Absorbance at 375 nm** | **% Removal** |
| 0 | 0.757 | 0 |
| 30 | 0.668 | 11.7 |
| 60 | 0.655 | 13.5 |

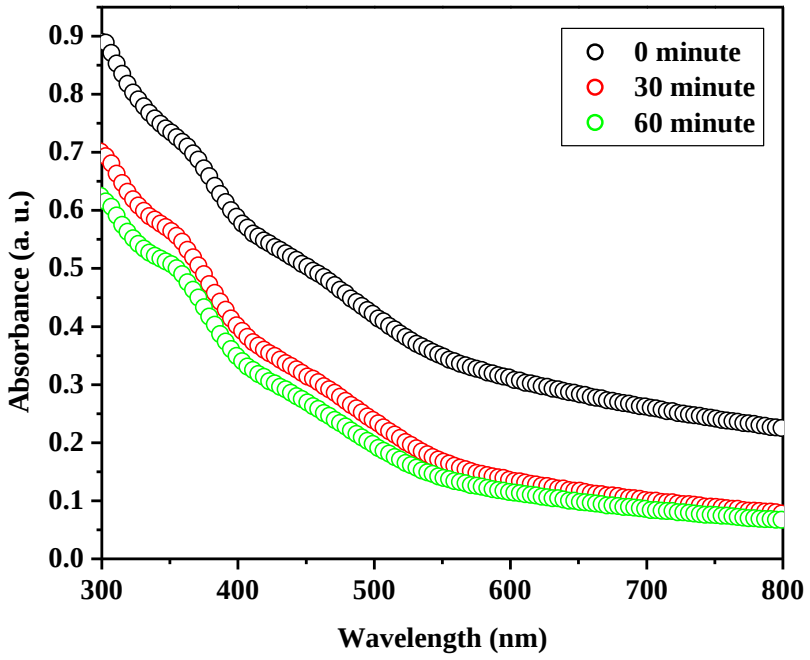



**Fig. S1.1.** Absorbance spectra for $UO_2S$ thin film dipped in double distilled water at different time intervals

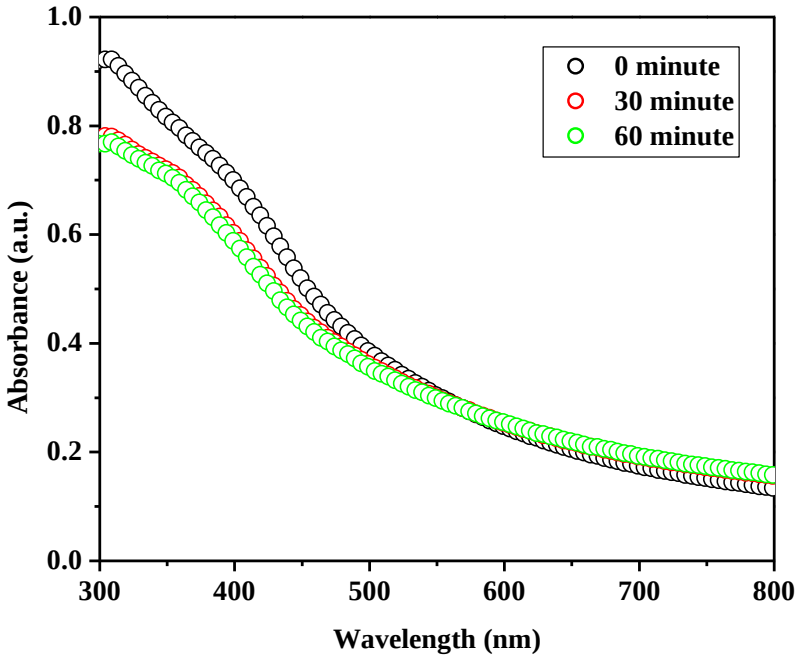



**Fig. S1.2.** Absorbance spectra for $Ag_2S$ thin film dipped in double distilled water at different time intervals

# Supporting Information, S2

# FE-SEM Images

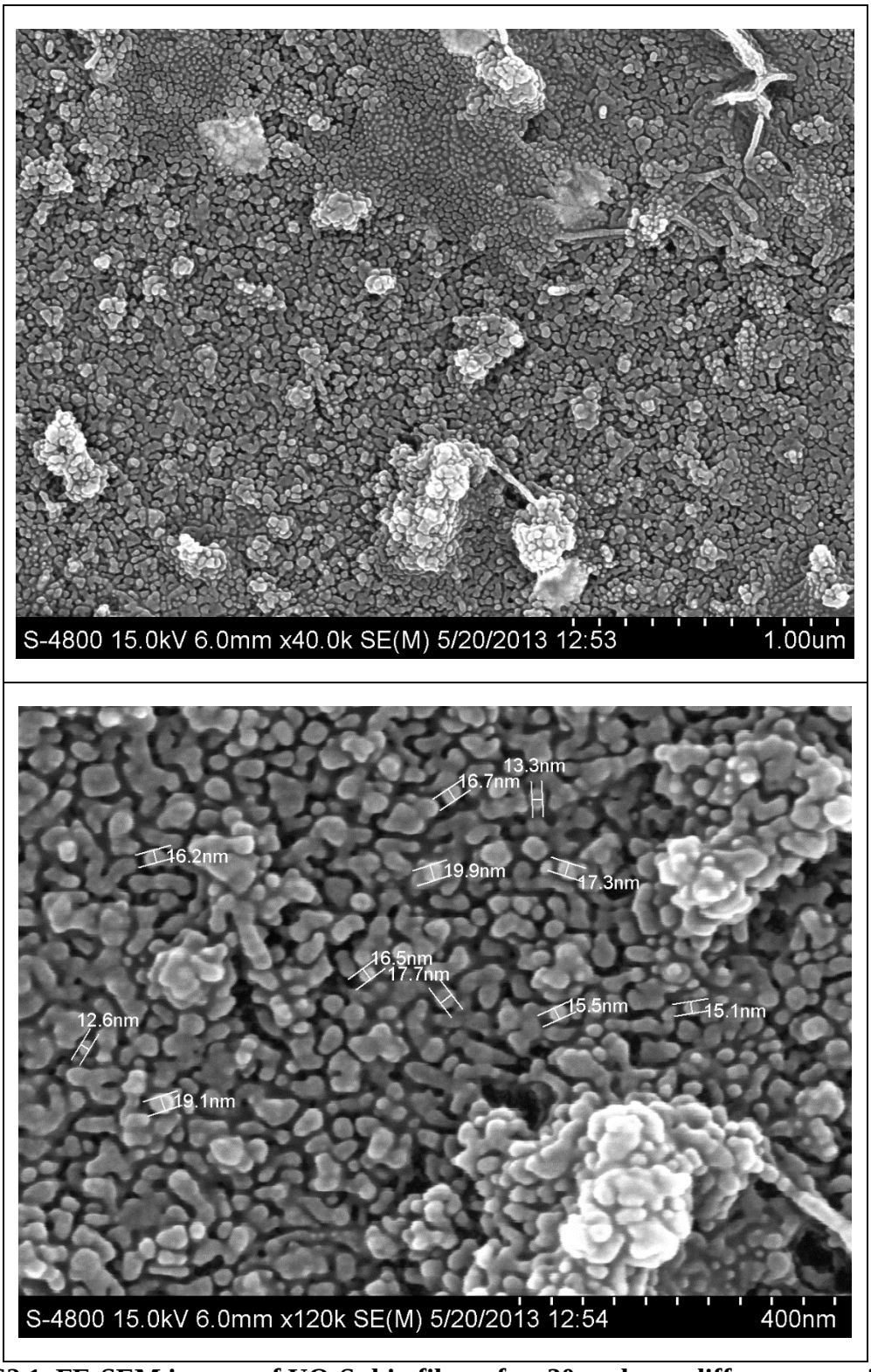



**Figure S2.1. FE-SEM images of $UO_2S$ thin films after 30 cycles at different magnification**

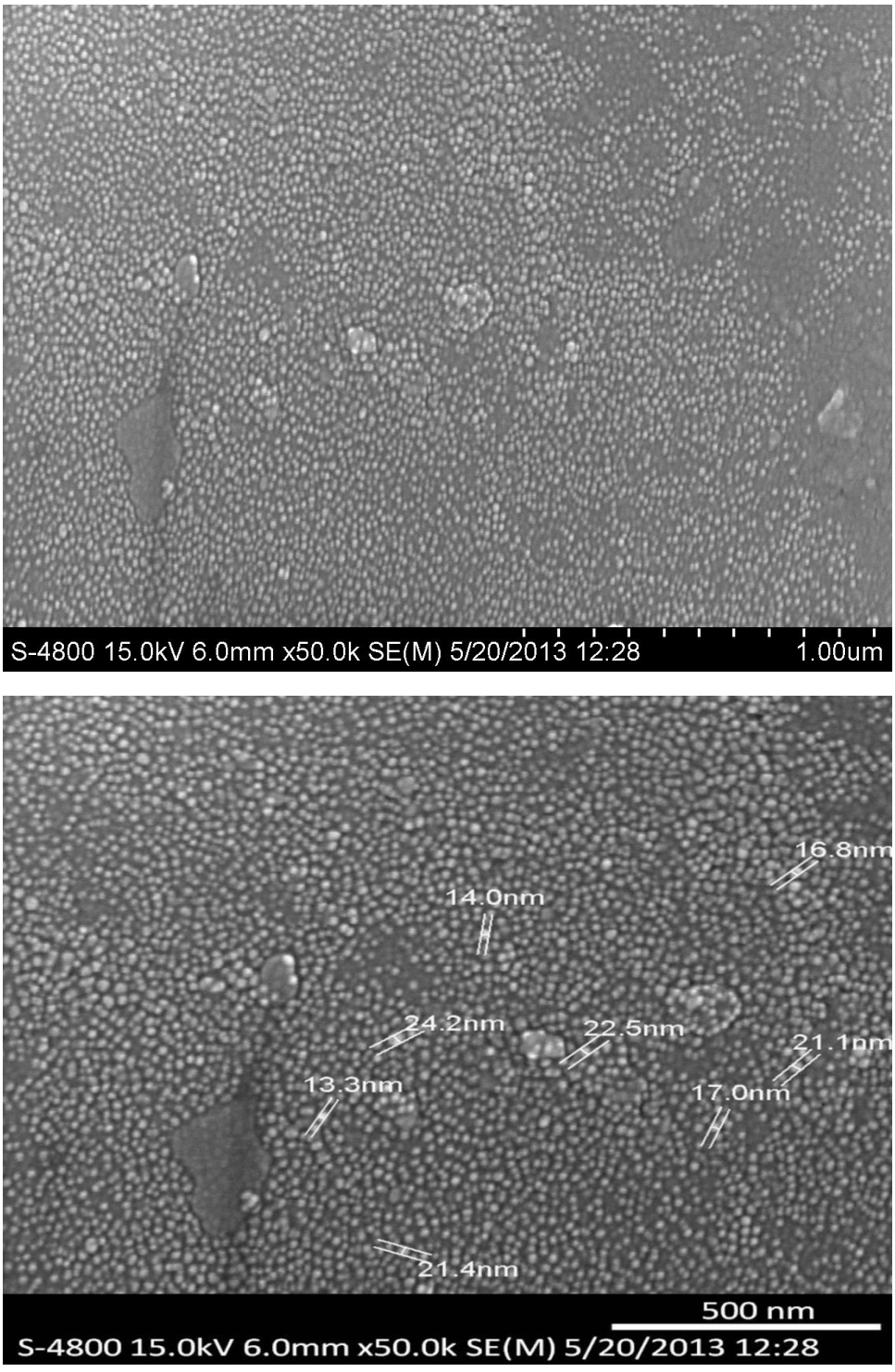



**Figure S2.2. FE-SEM image of $UO_2S$ thin films after 50 cycles at different magnification**

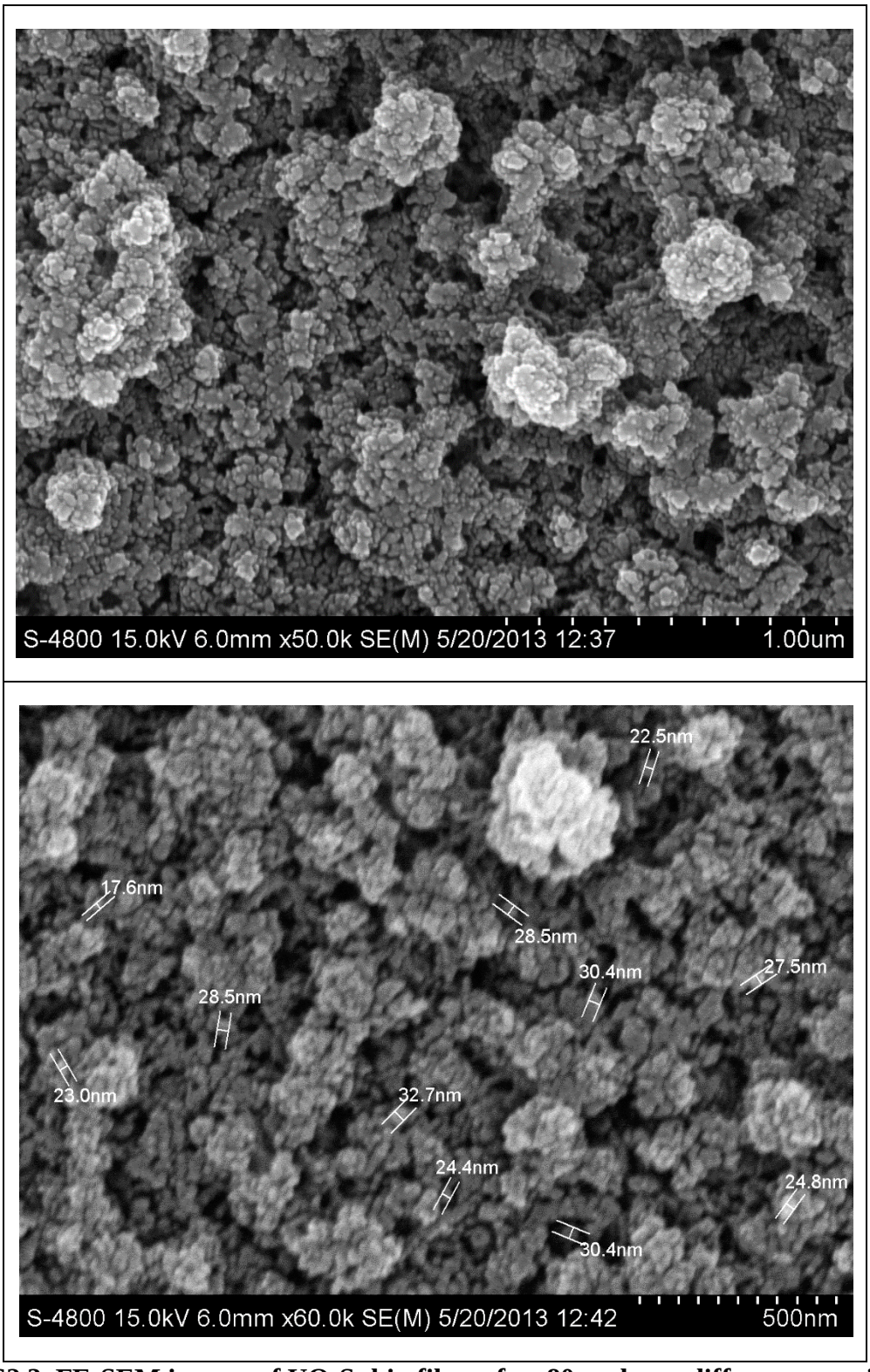



**Figure S2.3. FE-SEM images of $UO_2S$ thin films after 80 cycles at different magnification**

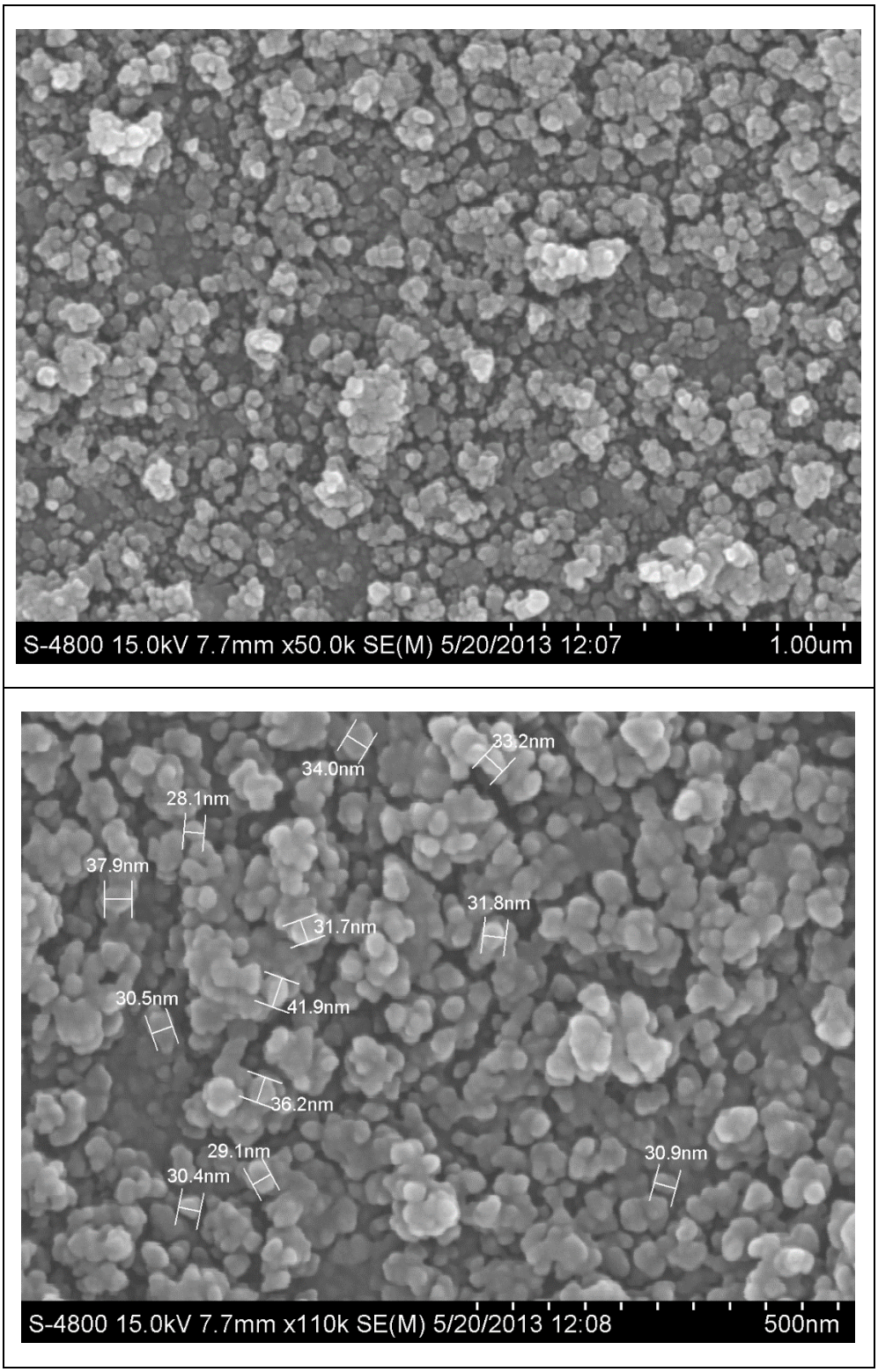



**Figure S2.4. FE-SEM images of $UO_2S$ - $Ag_2S$ thin film after 2 hrs at different magnification**

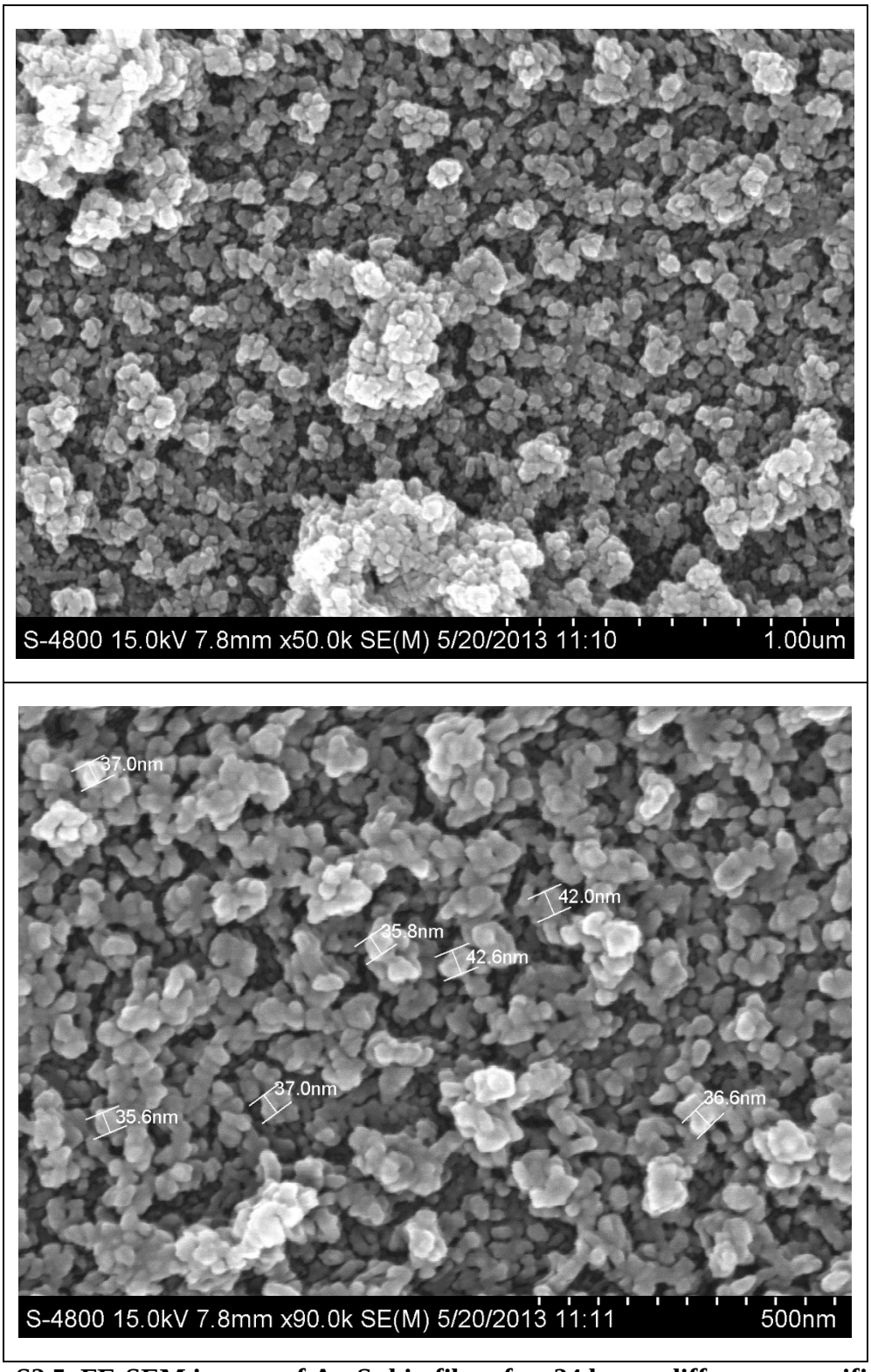
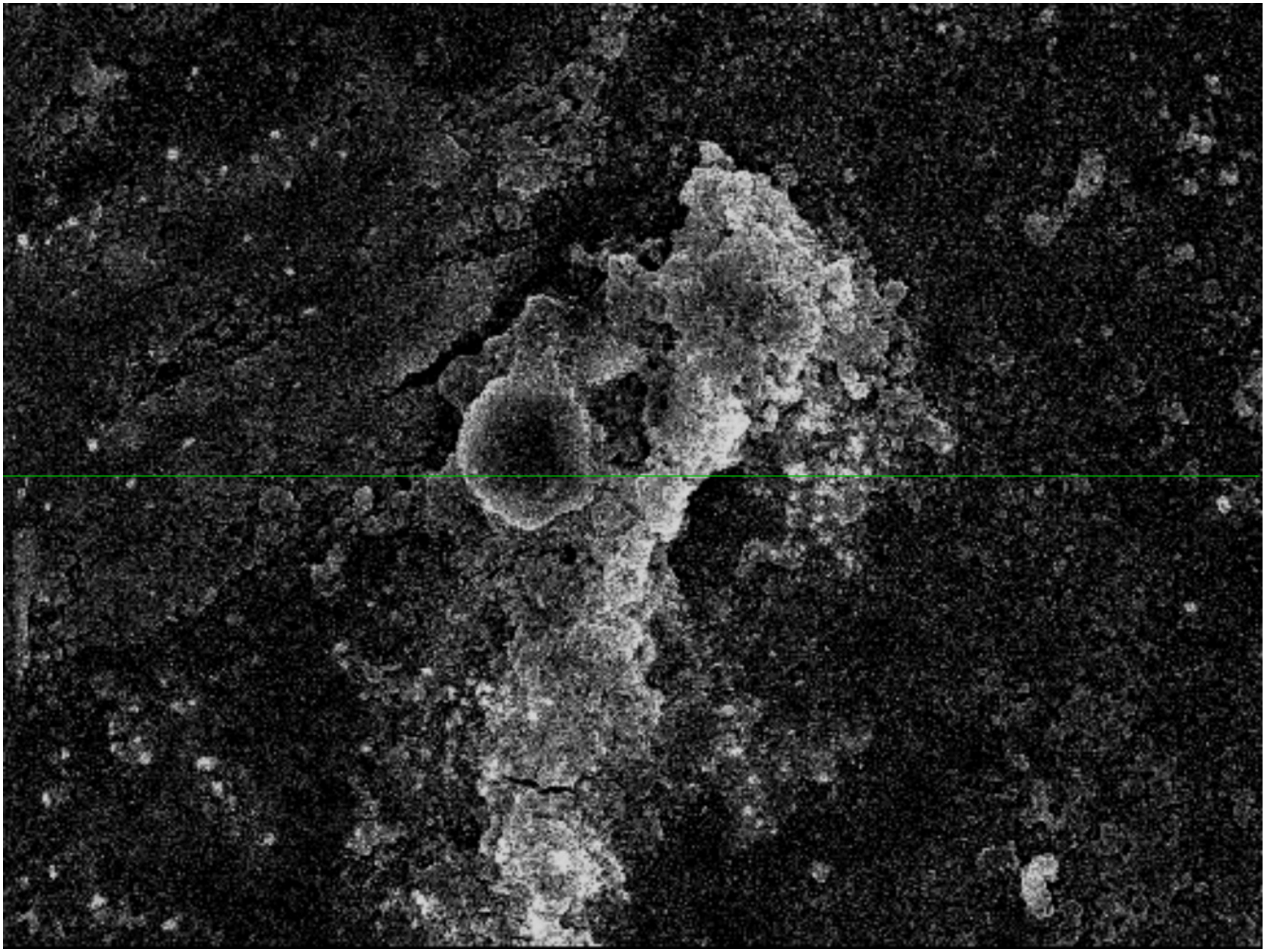



**Figure S2.5. FE-SEM images of $Ag_2S$ thin film after 24 hrs at different magnification**

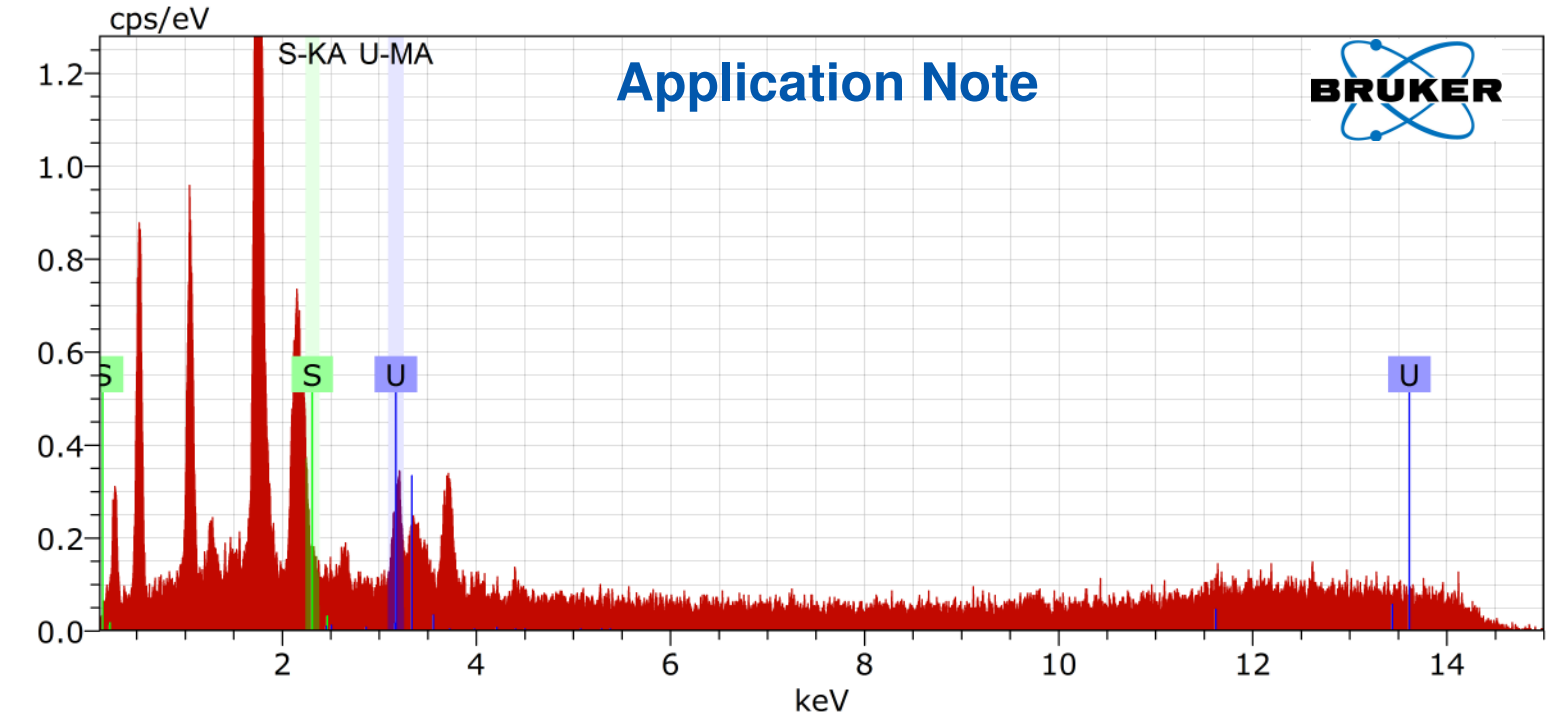
# Supporting Information, S3

# EDX Analysis Report for $UO_2S$ thin films

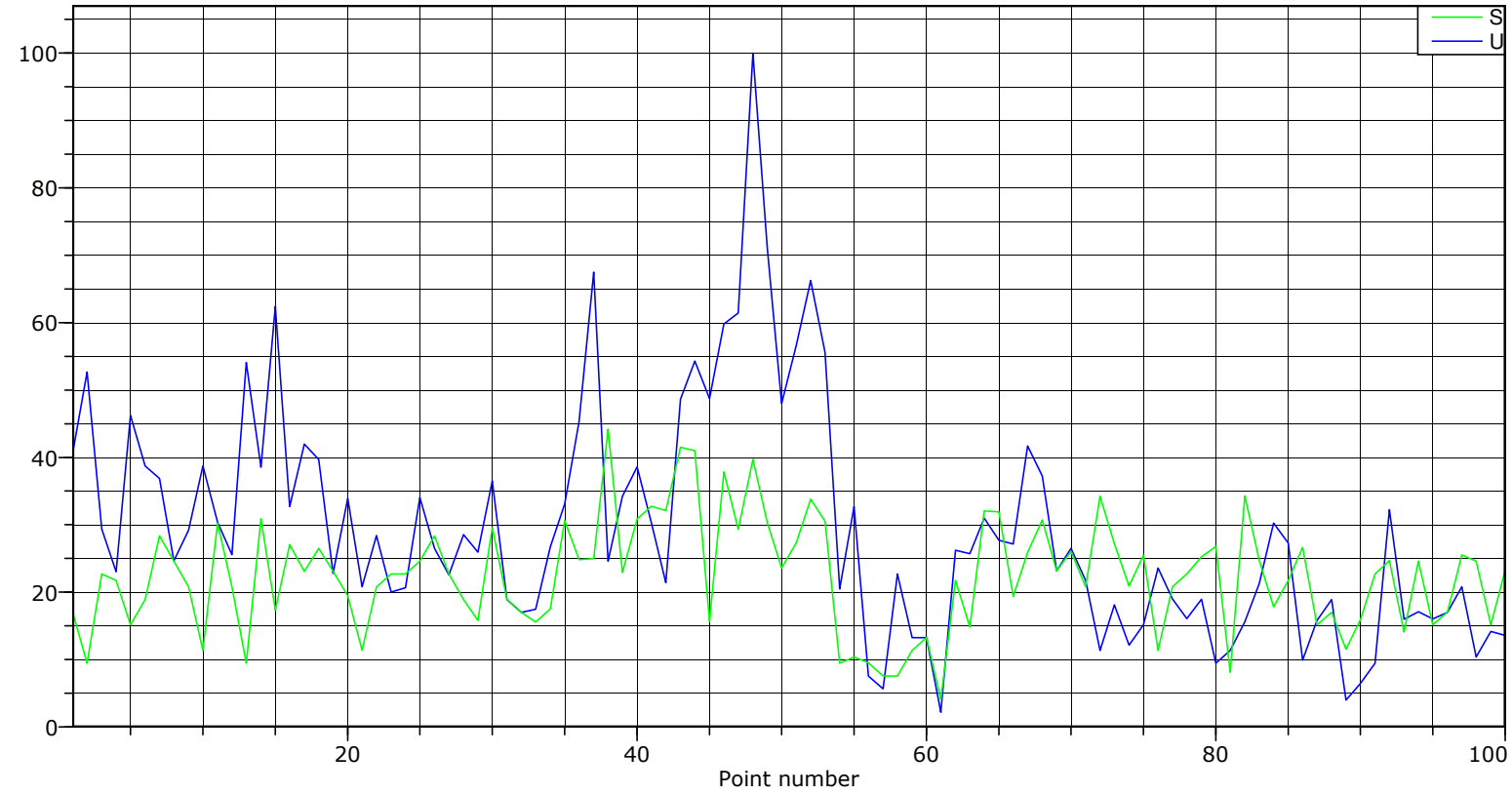
# after 30 cycles

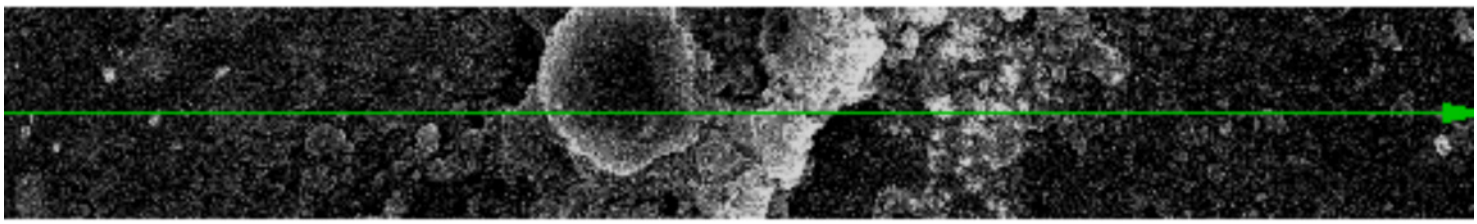


1 723Date:5/20/2013 12:52:38 PMImage size:512 x 384Mag:4000xHV:15.0kV




Scan Date:5/20/2013 12:51:45 PM HV:15.0kV Puls th.:1.78kcps



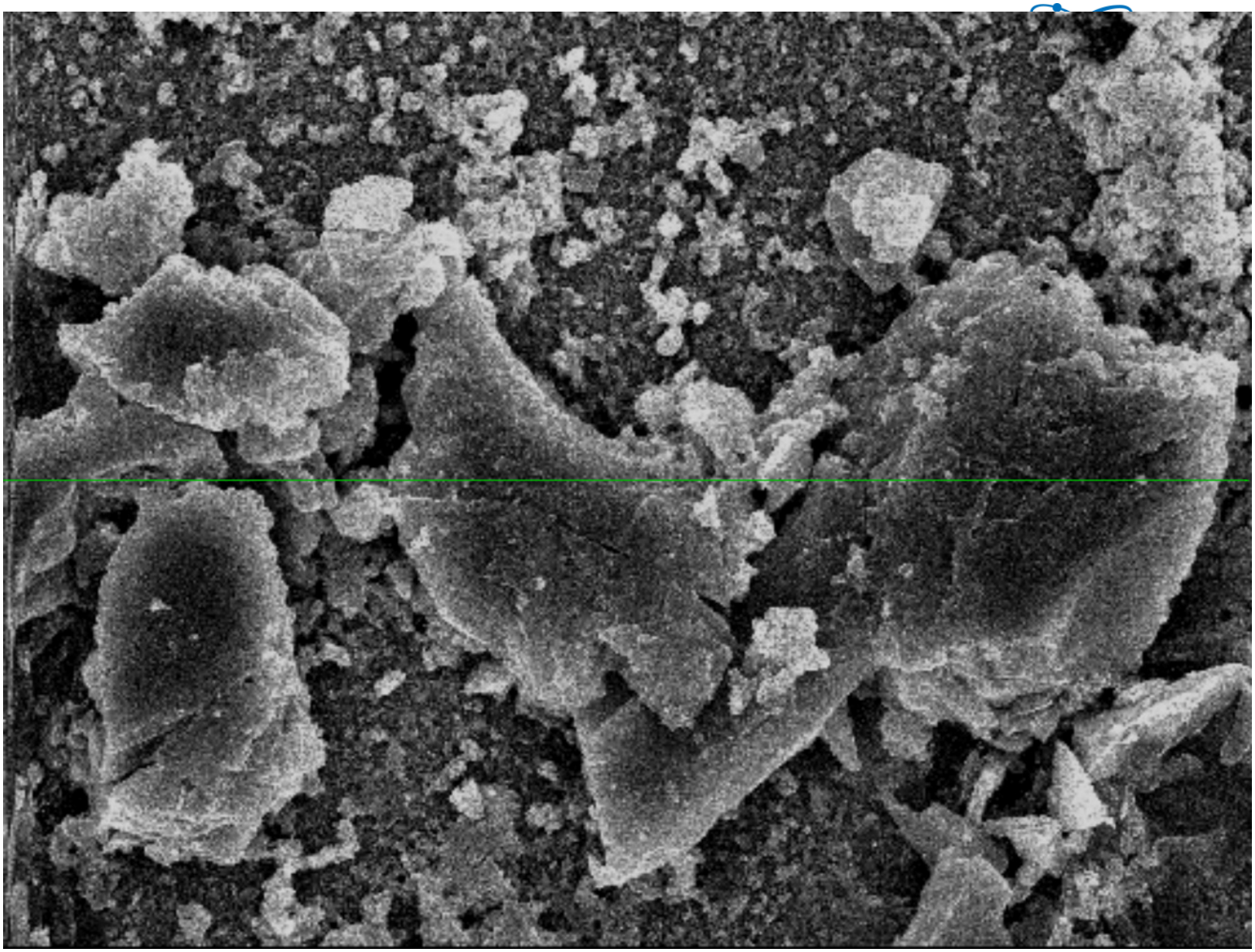



Scan dataDate:5/20/2013 12:52:38 PMMeasure time:45 sStart:(0,192) End:(511,192)Length:0 µm

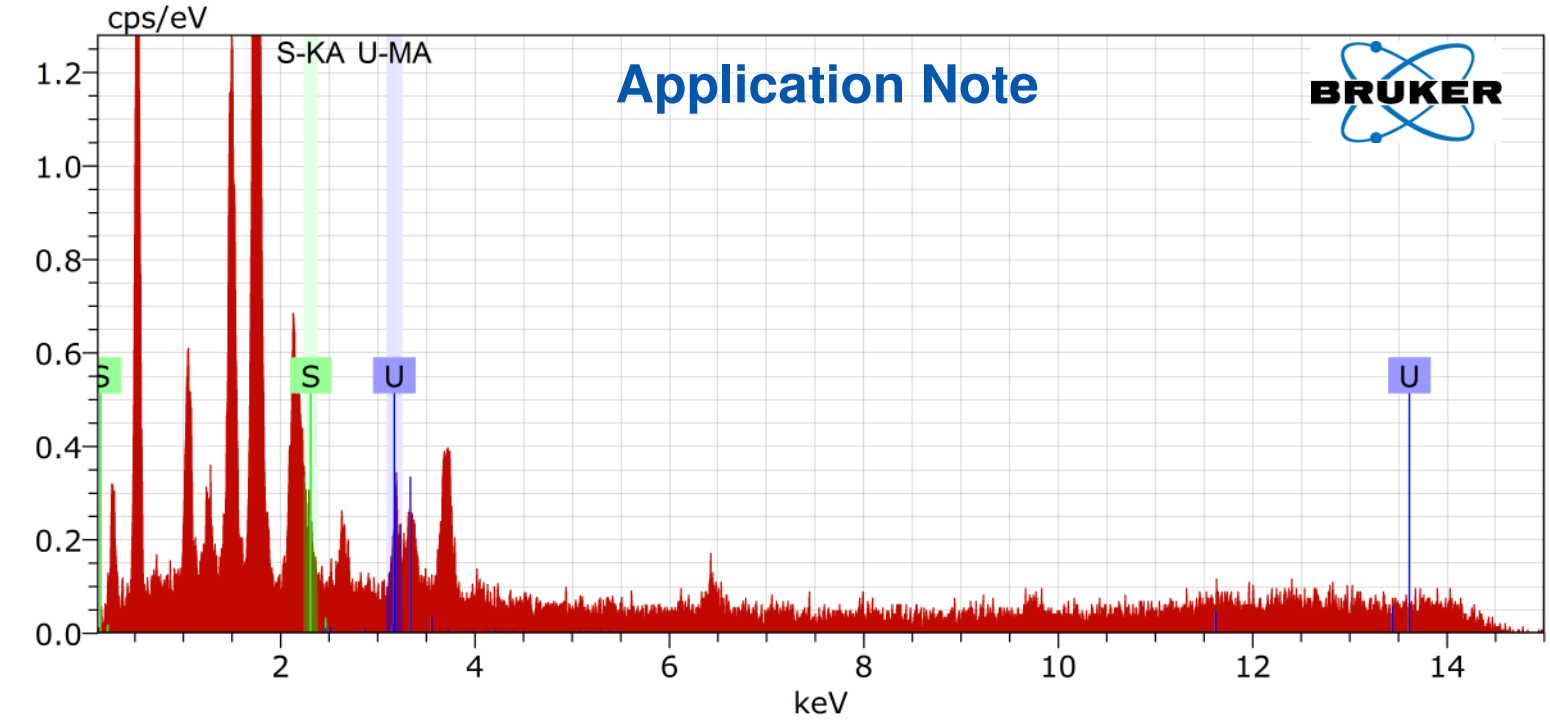
# Supporting Information, S4

# EDX Analysis Report for $UO_2S$ thin films

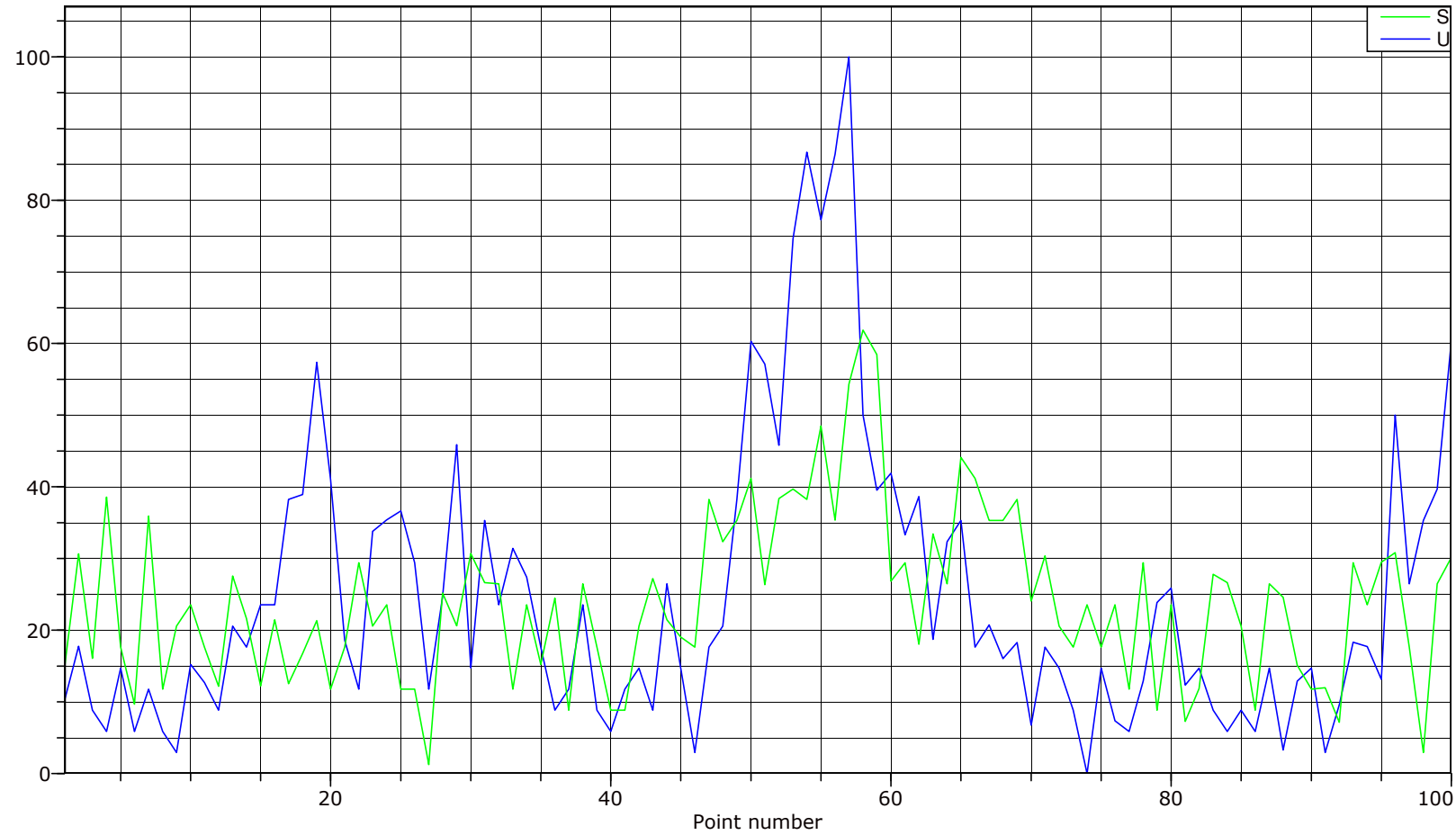
# after 50 cycles

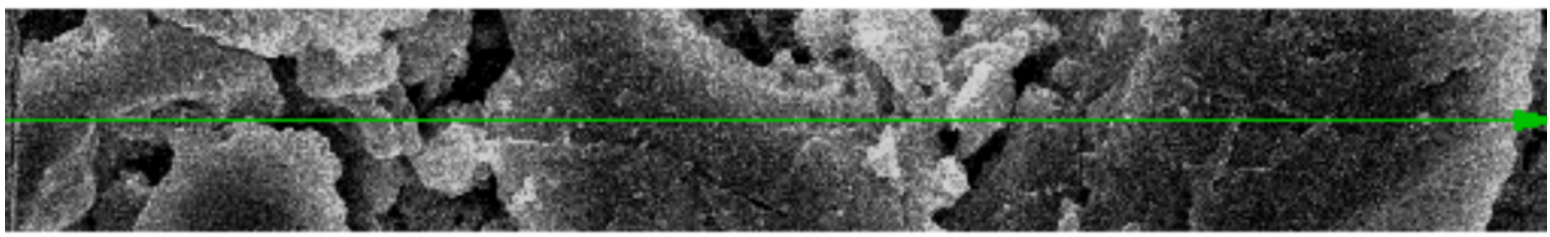


1 720Date:5/20/2013 12:23:34 PMImage size:512 x 384Mag:4000xHV:15.0kV




Scan Date:5/20/2013 12:22:56 PM HV:15.0kV Puls th.:1.70kcps



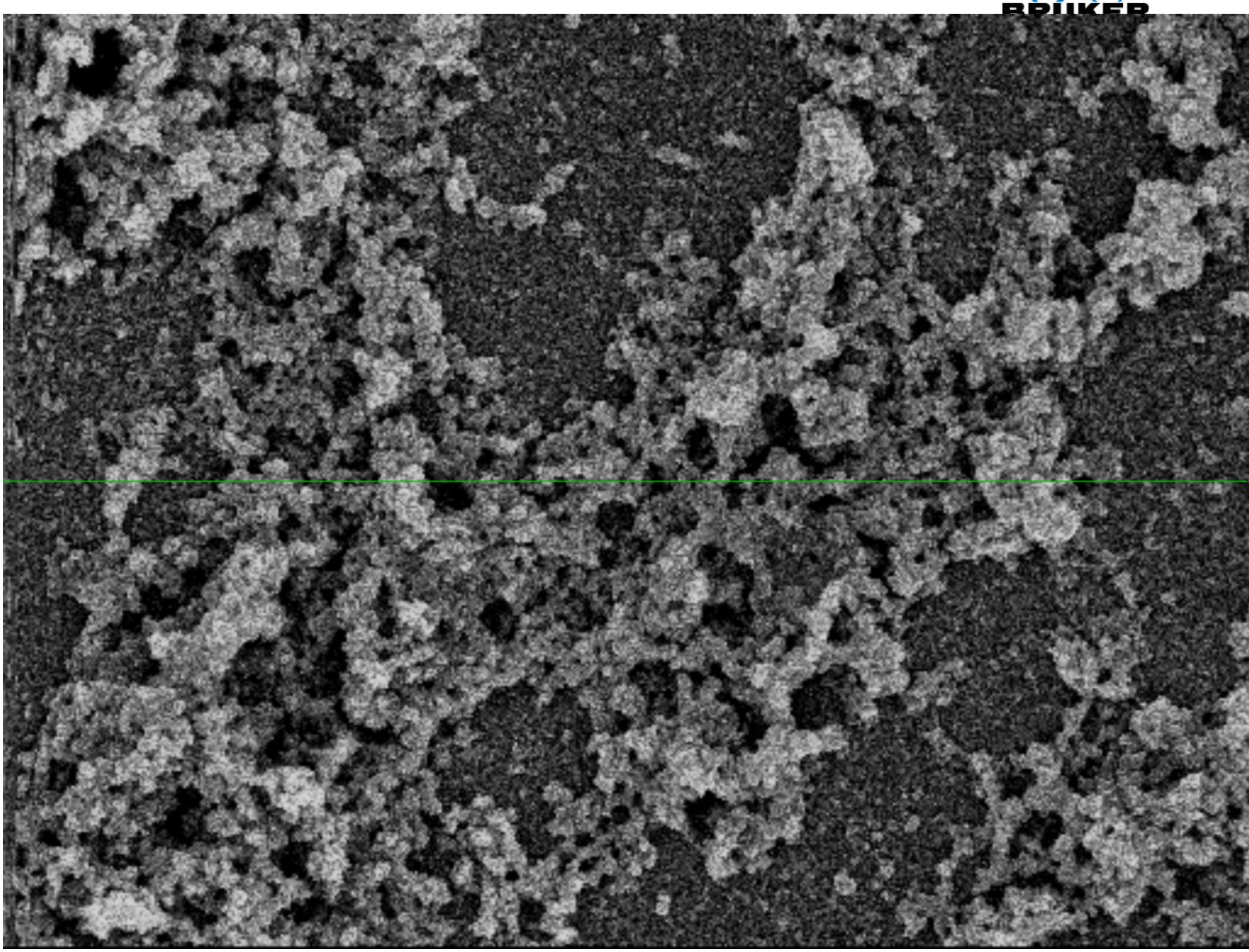



Scan dataDate:5/20/2013 12:23:34 PMMeasure time:29 sStart:(0,192) End:(511,192)Length:0 µm

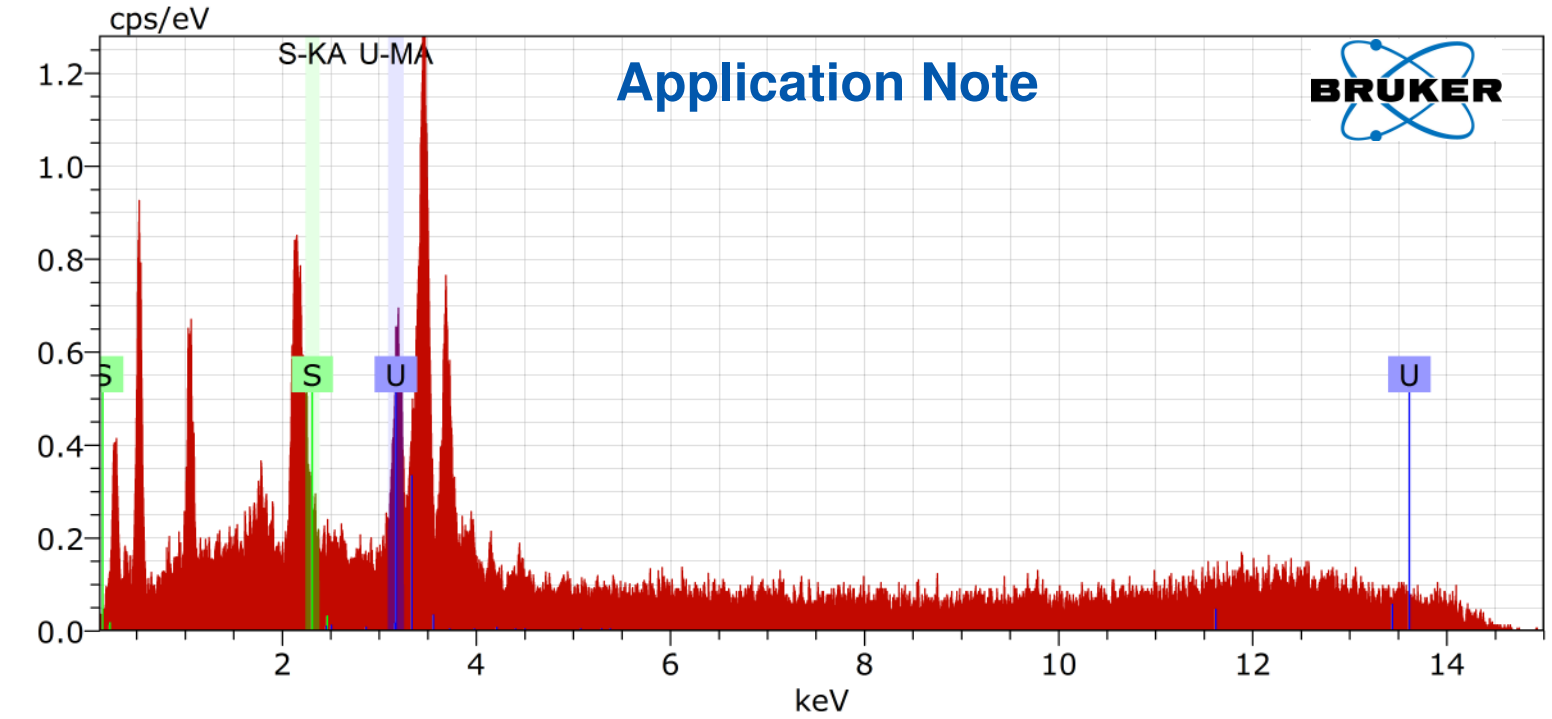
# Supporting Information, S5

# EDX Analysis Report for $UO_2S$ thin films

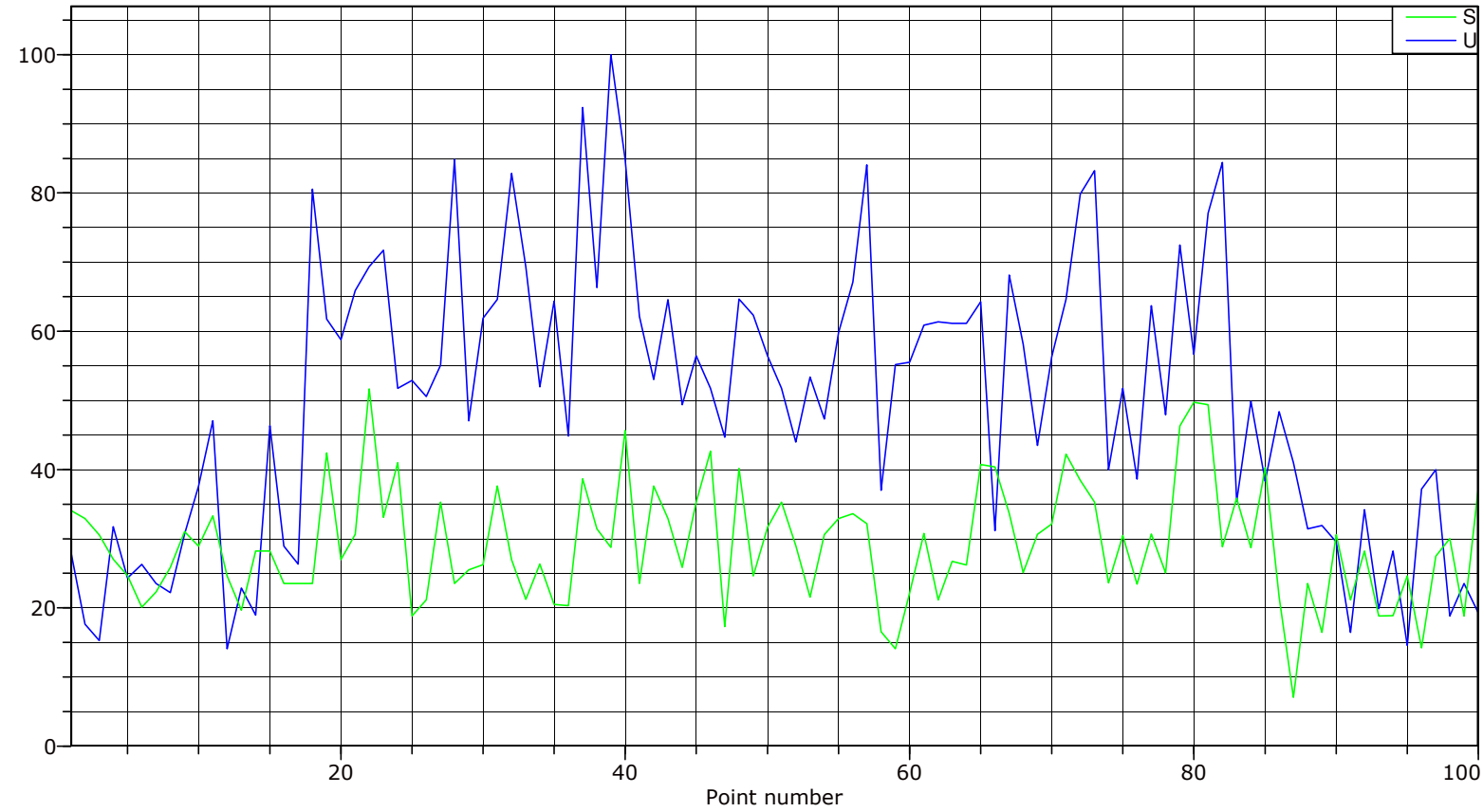
# after 80 cycles

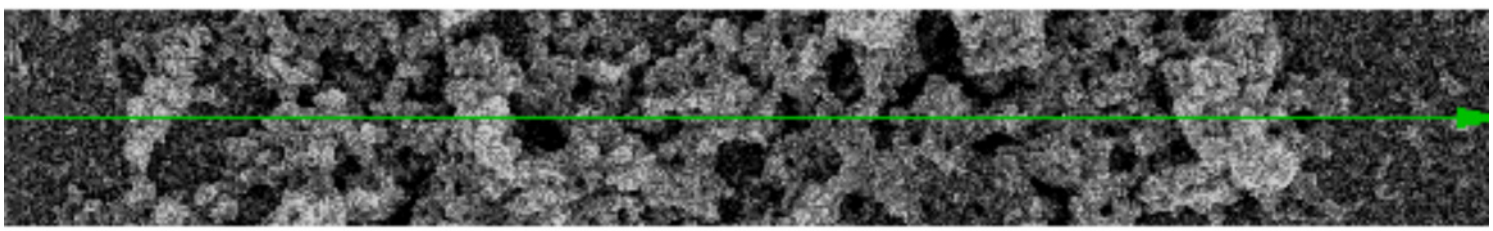


1 722Date:5/20/2013 12:38:31 PMImage size:512 x 384Mag:4000xHV:15.0kV




Scan Date:5/20/2013 12:37:52 PM HV:15.0kV Puls th.:2.12kcps

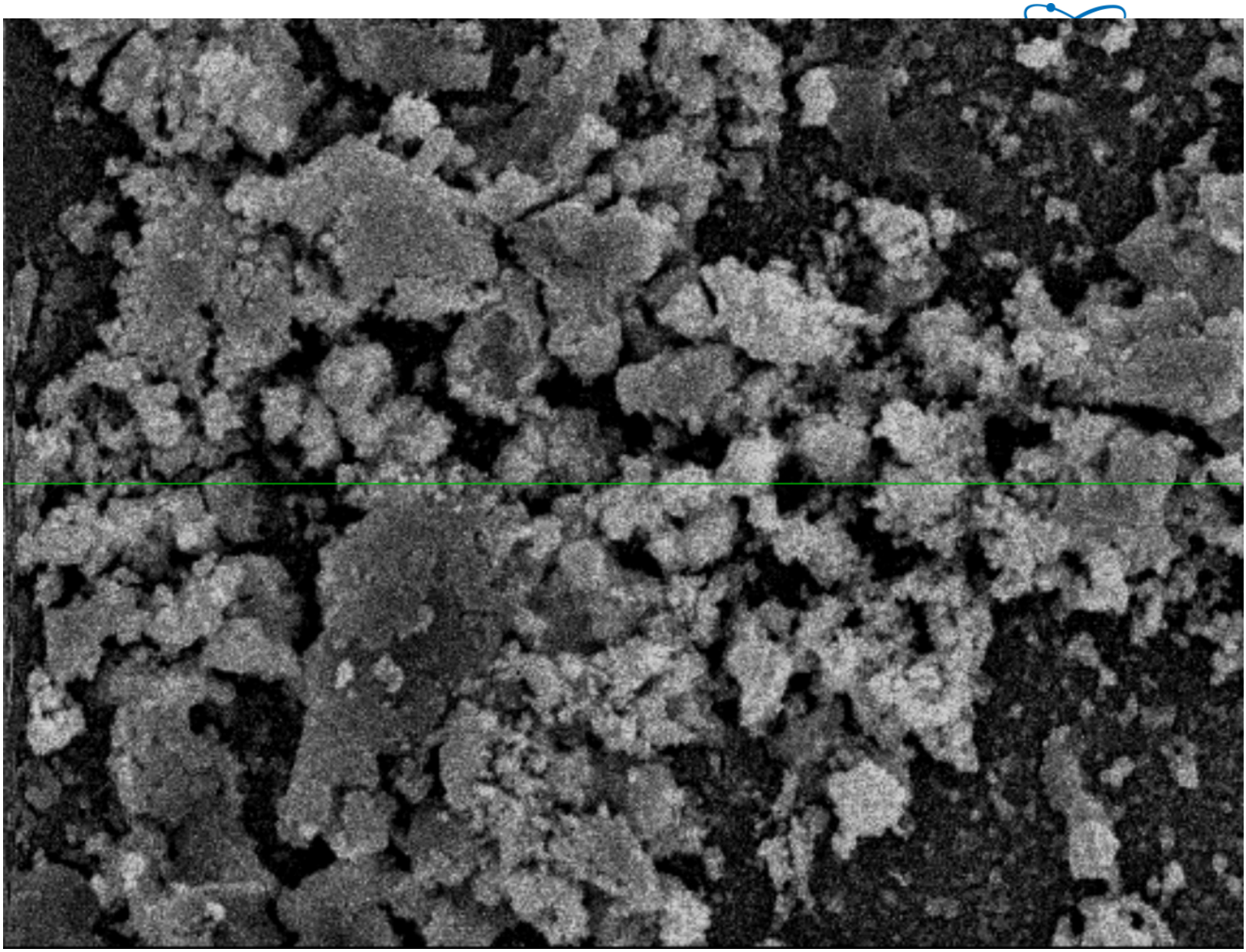


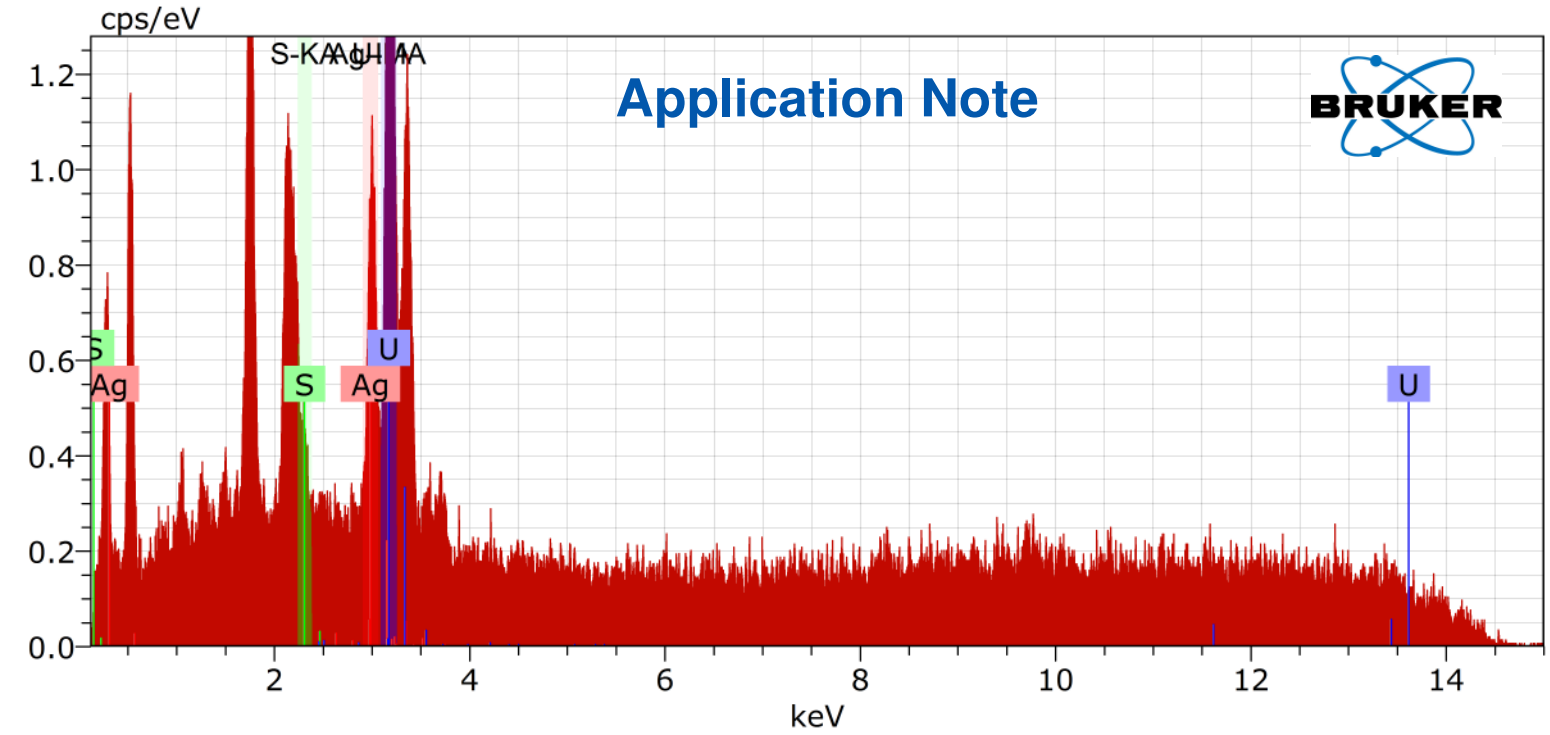
Scan dataDate:5/20/2013 12:38:31 PMMeasure time:30 sStart:(0,192) End:(511,192)Length:0 µm

# Supporting Information, S6

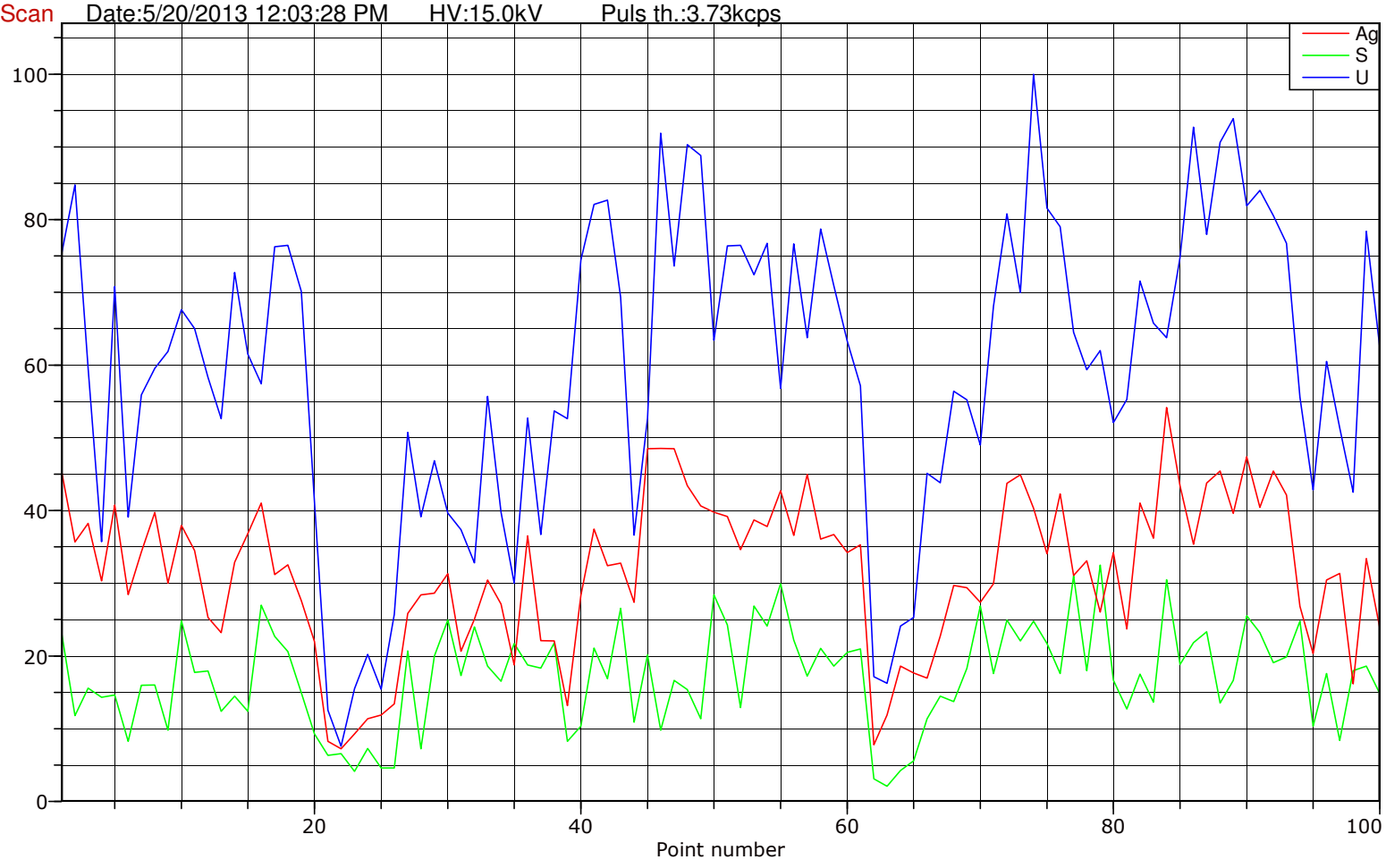
# EDX Analysis Report for $UO_2S$ - $Ag_2S$ thin film after 2 hrs

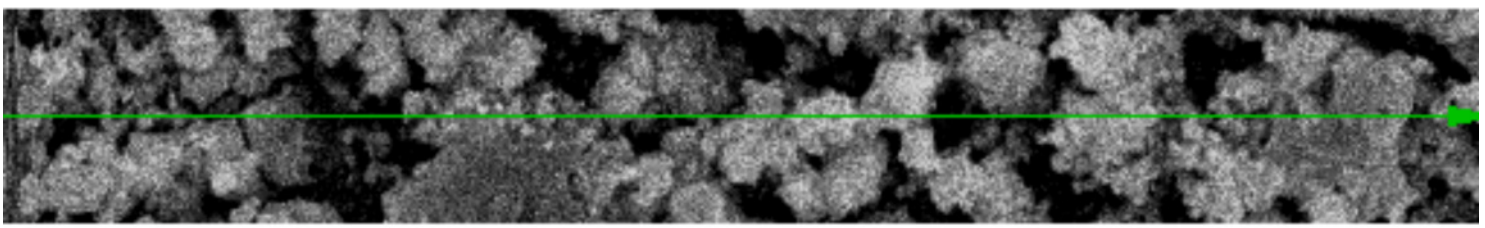


1 719Date:5/20/2013 12:04:05 PMImage size:512 x 384Mag:4000xHV:15.0kV




Scan Date:5/20/2013 12:03:28 PM HV:15.0kV Puls th.:3.73kcps

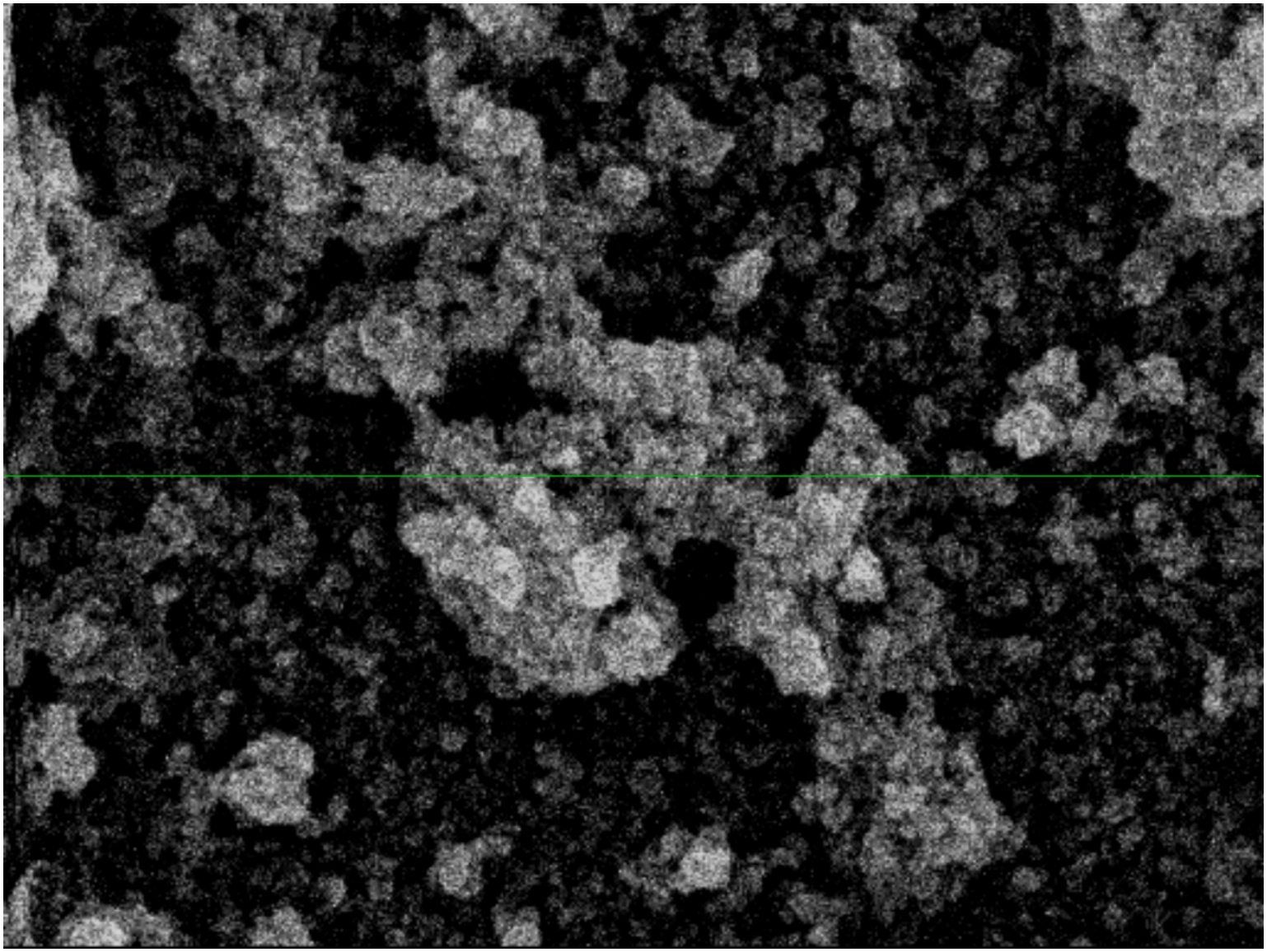


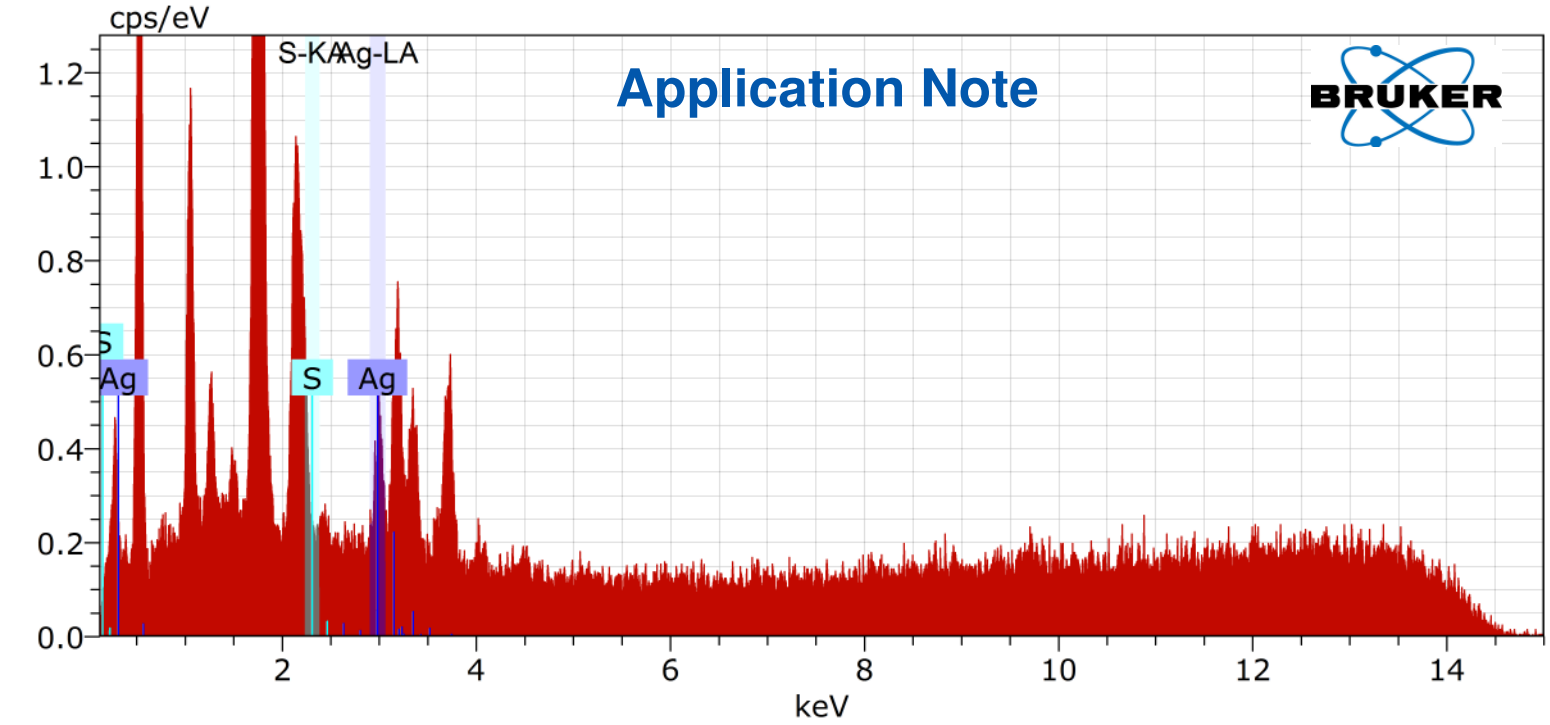
Scan dataDate:5/20/2013 12:04:05 PMMeasure time:28 sStart:(0,192) End:(511,192)Length:0 µm

# Supporting Information, S7

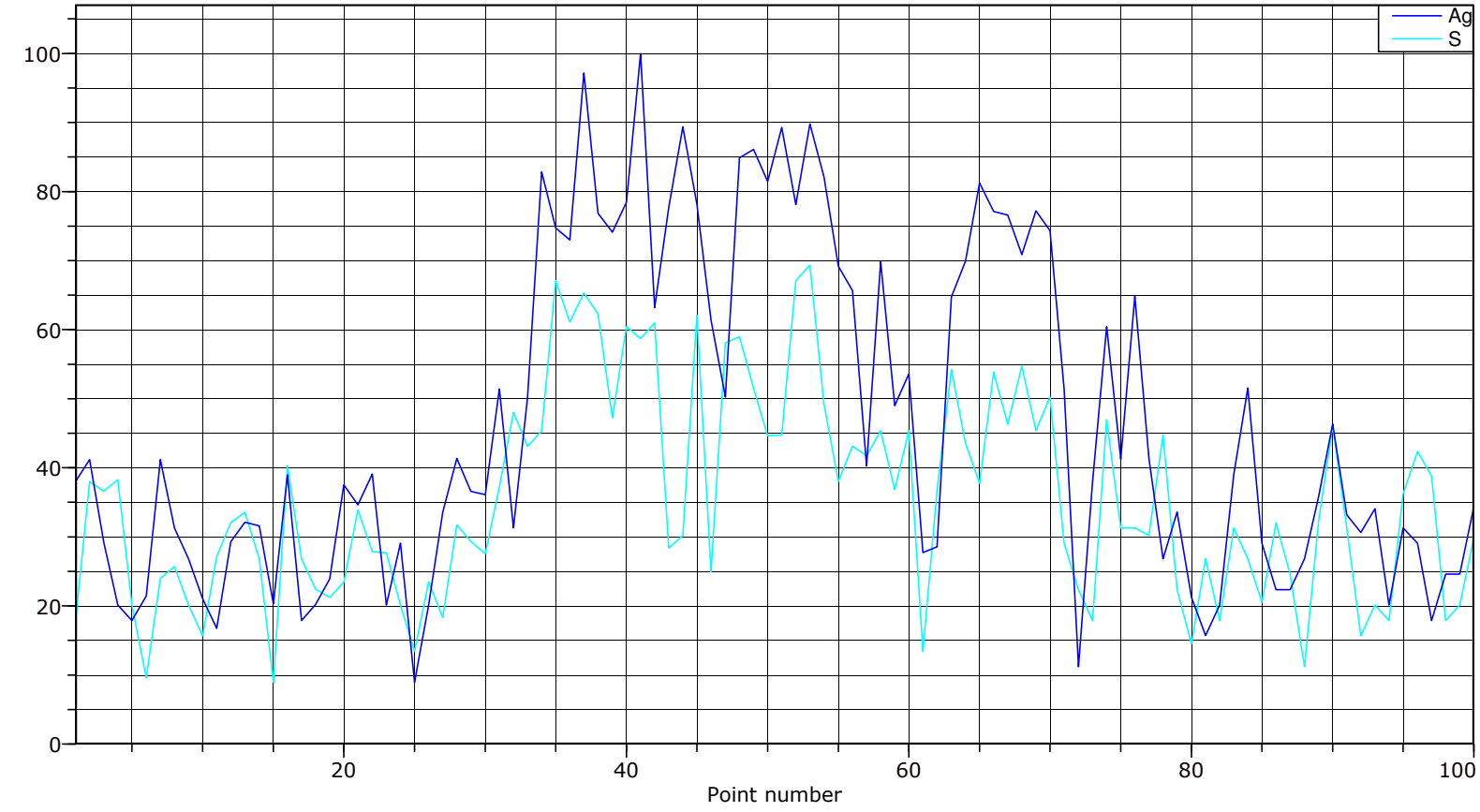
# EDX Analysis Report for $Ag_2S$ thin film after 24 hrs

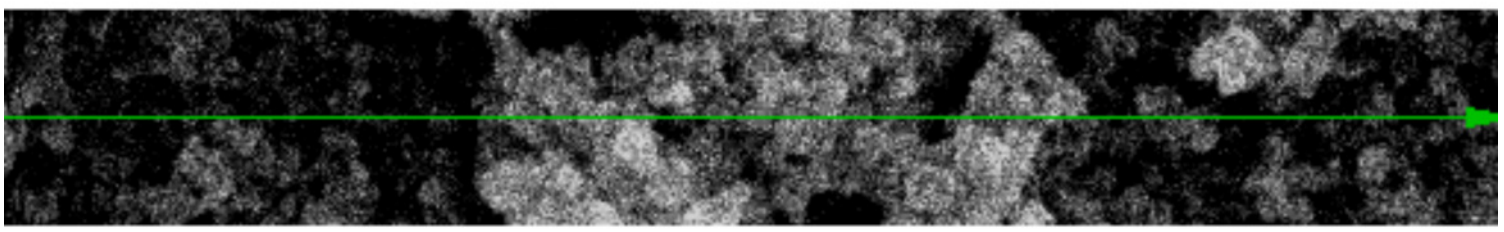


1 715Date:5/20/2013 11:06:43 AMImage size:512 x 384Mag:2000xHV:15.0kV




Scan Date:5/20/2013 11:05:38 AM HV:15.0kV Puls th.:3.68kcps



Scan dataDate:5/20/2013 11:06:43 AMMeasure time:40 sStart:(0,192) End:(511,192)Length:0 µm

# Supporting information, S8

# FT-IR Spectra

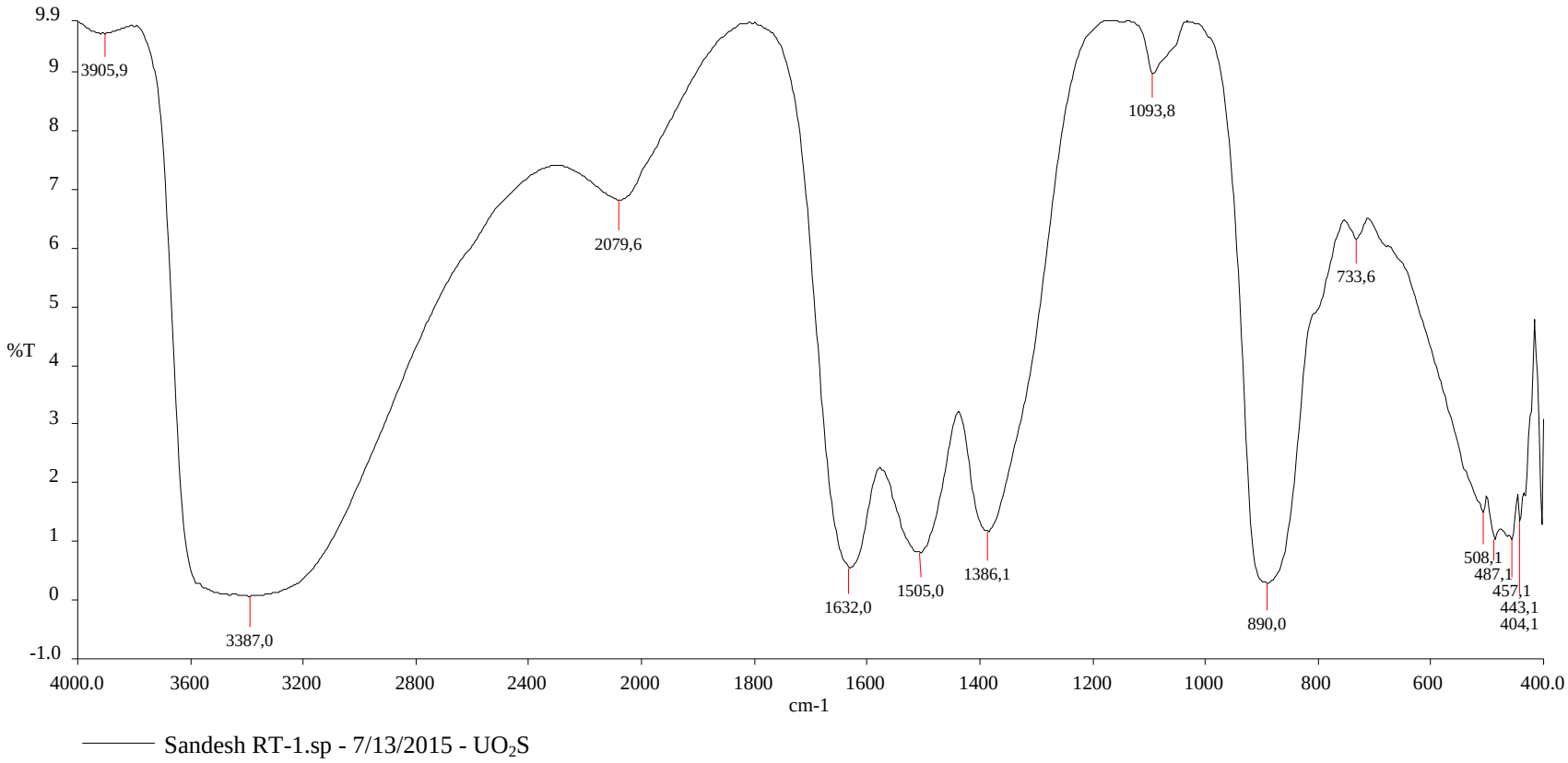



**Fig. S8.1.** FT-IR Spectrum of $UO_2S$

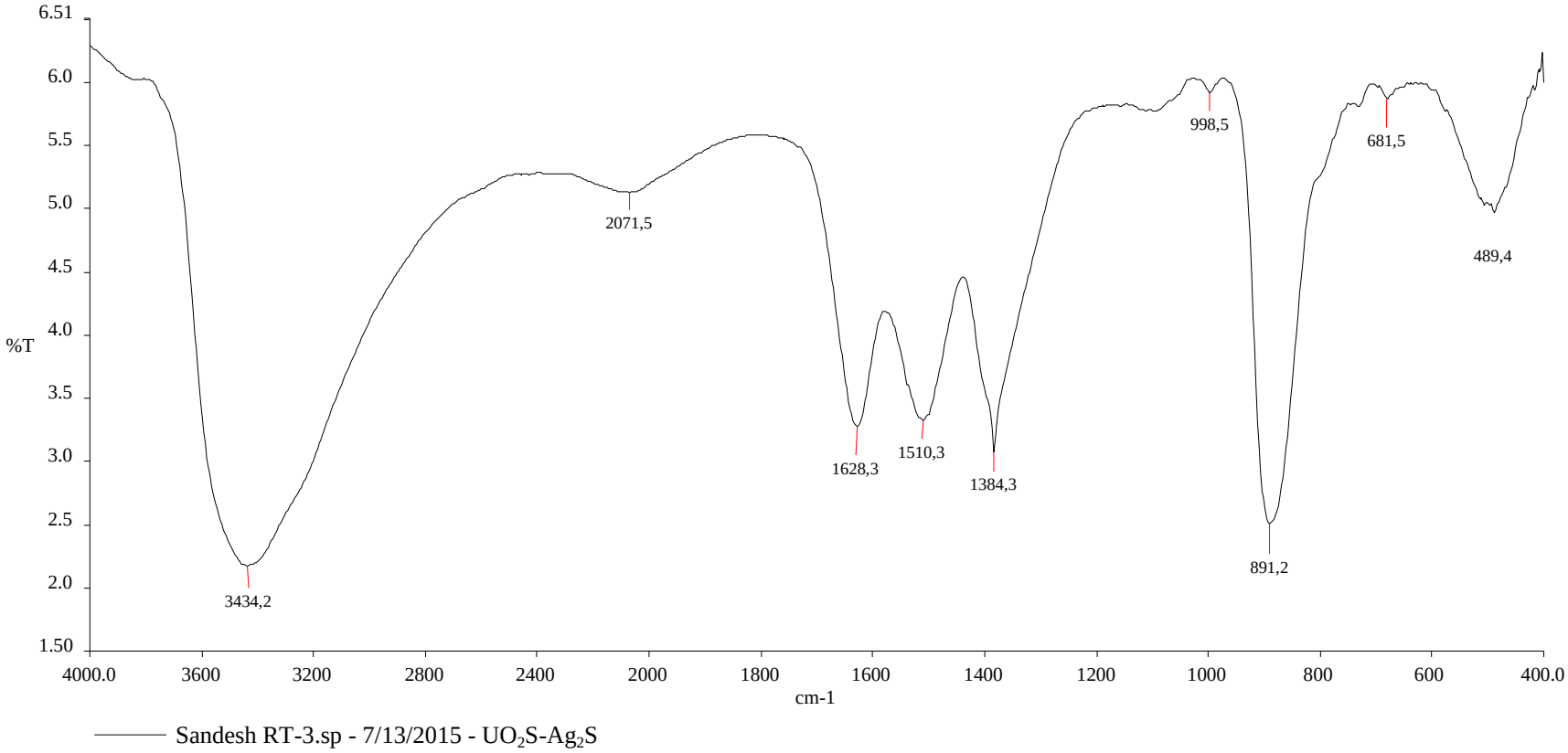



**Fig. S8.2.** FT-IR Spectrum of $UO_2S$-$Ag_2S$ (2 hrs)

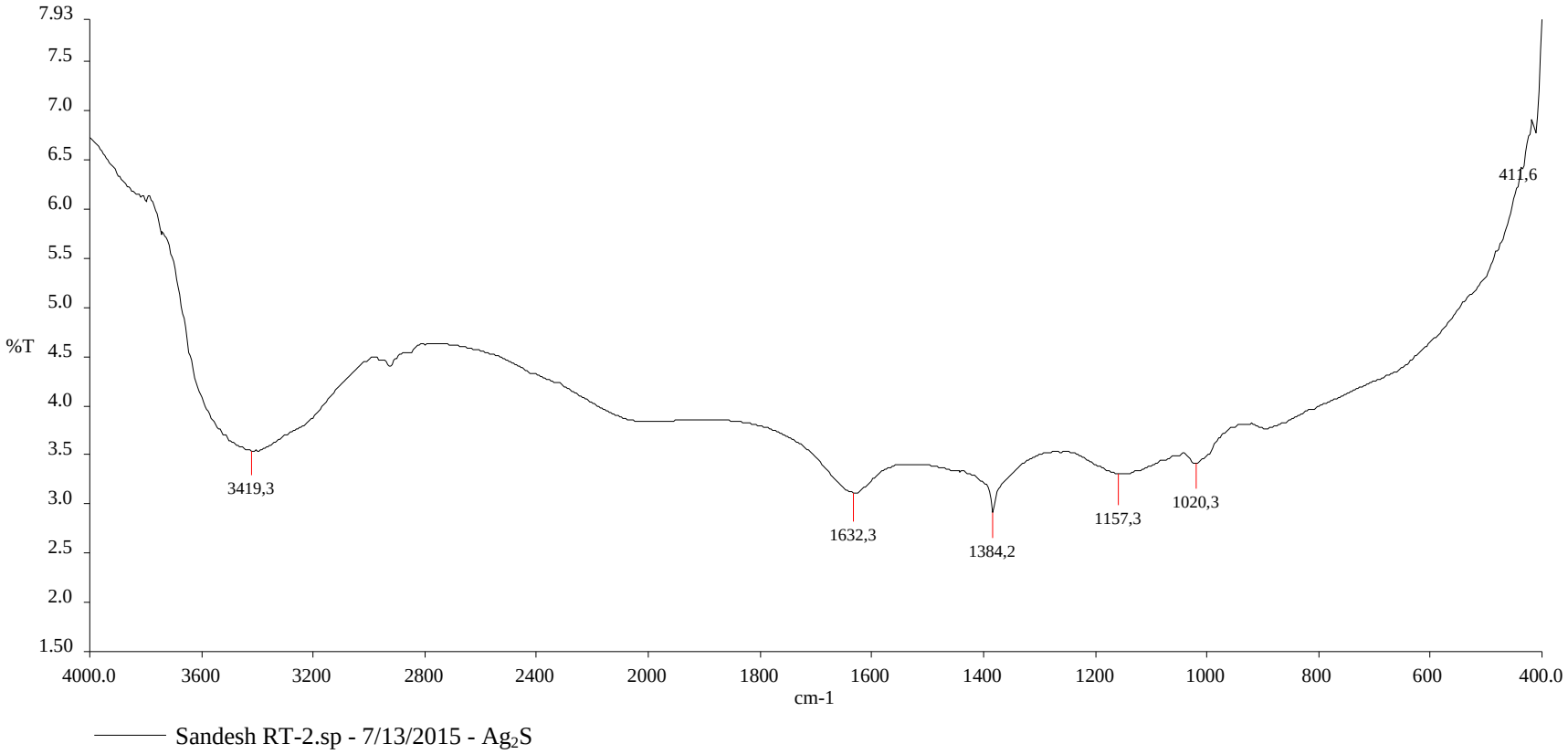
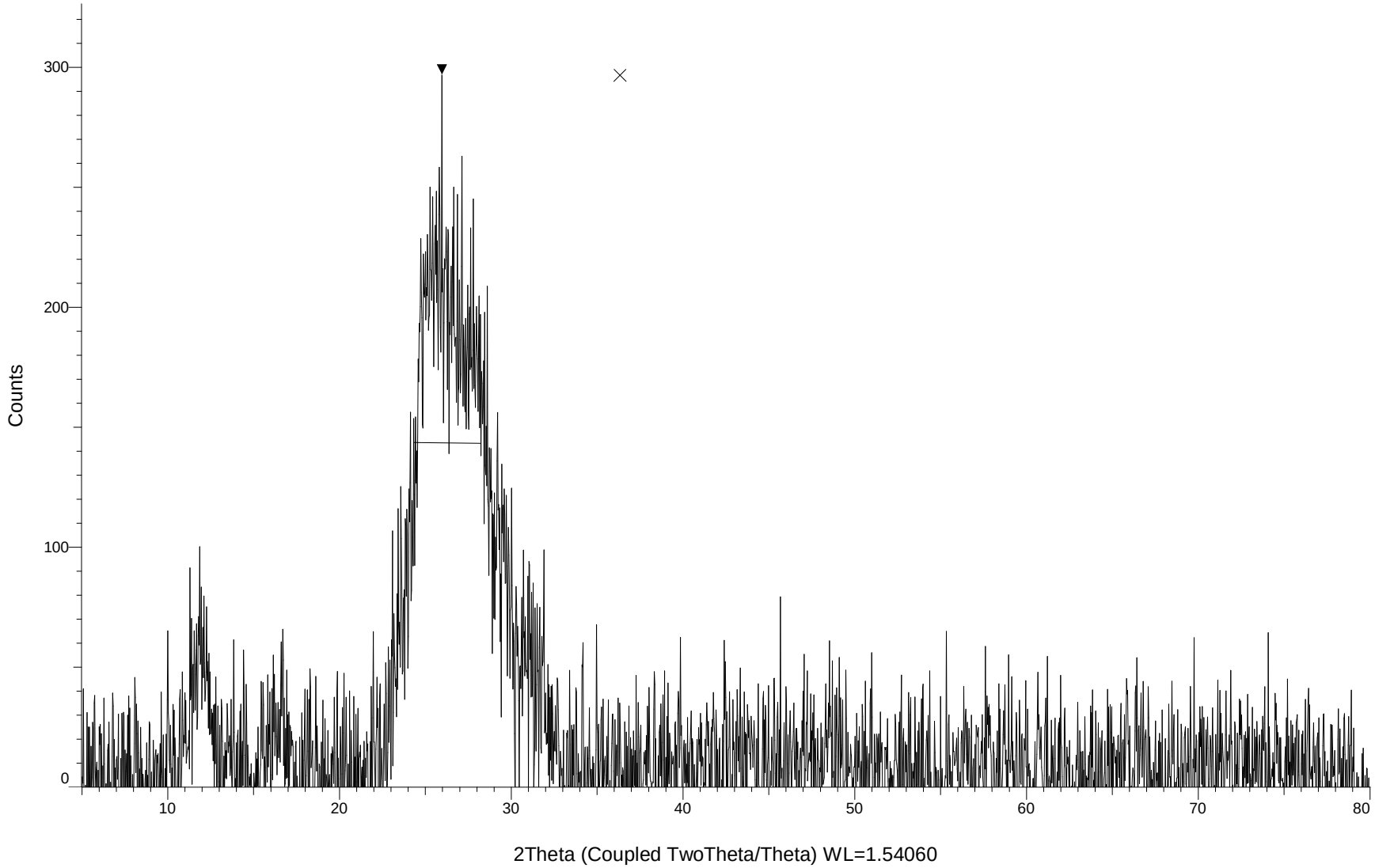



**Fig. S8.3.** FT-IR Spectrum of $Ag_2S$ (24 hrs)

# Supporting Information, S9

# XRD Analysis Report for $UO_2S$ thin film

## (Coupled TwoTheta/Theta)



# 2Theta

| Visible | Icon | Color | Index | Name | Parent | Sample Name | File Name | Scan Type |
|---|---|---|---|---|---|---|---|---|
| Yes | | | 1 | UO2S 1.raw | 2Theta | | UO2S 1.raw | Coupled TwoTheta/Theta |

| Scan Status | Start | End | Step Size | Time per Step | Temperature | Time Started | Goniometer radius |
|---|---|---|---|---|---|---|---|
| Completed | 5.000 | 80.000 | 0.030 | 0.5 | 25 (Room) | 3.0 | 250.0 |

| 2-theta | Theta | Chi | Phi | X-Drive | Y-Drive | Z-Drive | Aux1 | Aux2 | Aux3 | Anode | kα1 | kα2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.000 | 2.500 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Cu | 1.54060 | 1.54439 |

| kα2 Ratio | kβ | Generator kV | Generator mA | Detector Name | Divergence Slit | Antiscatter Slit |
|---|---|---|---|---|---|---|
| 0.50000 | 1.39222 | 40.0 | 40.0 | Detector 1 | 1.200 | 0.600 |

| Slit Mode | Simul. Slit Mode | X-Offset | Displacement | Y-Scale Factor | Y-Offset | Humidity | Curvature |
|---|---|---|---|---|---|---|---|
| Fixed | | 0.000 | 0.000 | 1 | 0 | n.a. | 1.000 |

| Threshold | Enhanced | Compute Crystallinity | Cristallinity - From | Cristallinity - To | %-Crystallinity |
|---|---|---|---|---|---|
| 1.000 | No | Yes | 5.000 | 80.000 | 22.5 % |

| %-Amorphous | Global Area | Reduced Area | Company Name | Operator Name | Comment |
|---|---|---|---|---|---|
| 77.5 % | 15888 | 3577 | | | |

| Creation Date/Time |
|---|
| 01-Jan-01 12:00:00 AM |

# Area List #4

| Visible | Icon | Color | Index | Name | Parent | Scan | Left Angle | Right Angle |
|---|---|---|---|---|---|---|---|---|
| Yes | | | 1 | [5.000 - 80.000] | Area List #4 | UO2S 1.raw | 5.000 | 80.000 |

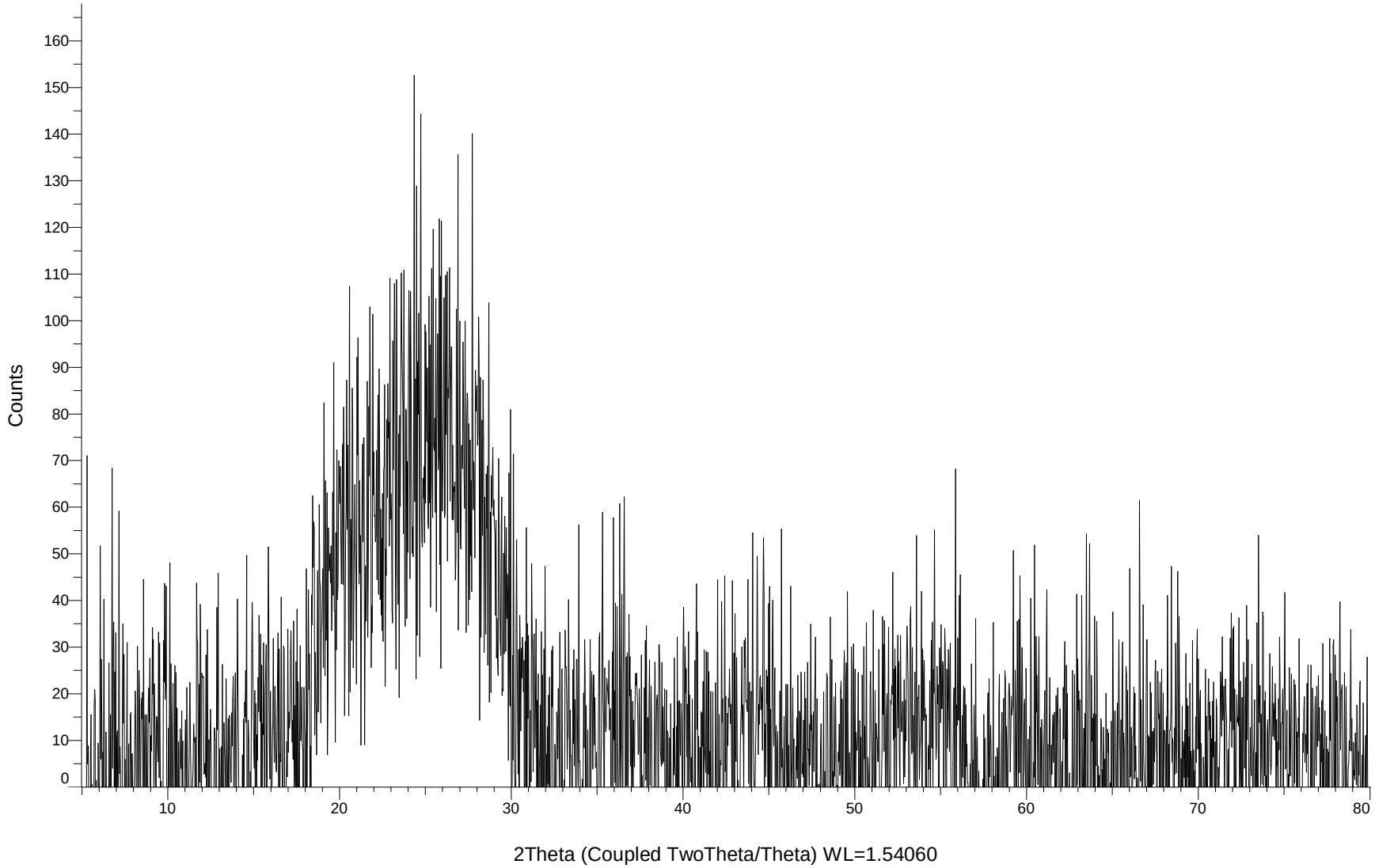
| Left Int. | Right Int. | Obs. Max | d (Obs. Max) | Gross Int. | Net Height | FWHM | Chord Mid. | d (Chord Mid.) |
|---|---|---|---|---|---|---|---|---|
| 1392 | 419 | 25.963 | 3.42912 | 1759 | 639 | 4.778 | 26.956 | 3.30501 |

| I. Breadth | Gravity C. | d (Gravity C.) | Raw Area | Net Area | C. Size | K | Instr. Width | Use I. Breadth |
|---|---|---|---|---|---|---|---|---|
| -16.059 | 23.725 | 3.74732 | 57641 | -10266 | 19.0 | 1.000 | 0.000 | No |

# Supporting Information, S10

# XRD Analysis Report for $UO_2S$ - $Ag_2S$ thin film dipped in 10 mM $AgNO_3$ for 2 hrs

## (Coupled TwoTheta/Theta)



# 2Theta

| Visible | Icon | Color | Index | Name | Parent | Sample Name | File Name |
|---|---|---|---|---|---|---|---|
| Yes | | | 1 | AG2S UO2S.raw | 2Theta | | AG2S UO2S.raw |

| Scan Type | Scan Status | Start | End | Step Size | Time per Step | Temperature | Time Started |
|---|---|---|---|---|---|---|---|
| Coupled TwoTheta/Theta | Completed | 5.000 | 80.000 | 0.030 | 0.5 | 25 (Room) | 7.0 |

| Goniometer radius | 2-theta | Theta | Chi | Phi | X-Drive | Y-Drive | Z-Drive | Aux1 | Aux2 | Aux3 | Anode |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 250.0 | 5.000 | 2.500 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Cu |

| kα1 | kα2 | kα2 Ratio | kβ | Generator kV | Generator mA | Detector Name | Divergence Slit |
|---|---|---|---|---|---|---|---|
| 1.54060 | 1.54439 | 0.50000 | 1.39222 | 40.0 | 40.0 | Detector 1 | 1.200 |

| Antiscatter Slit | Slit Mode | Simul. Slit Mode | X-Offset | Displacement | Y-Scale Factor | Y-Offset | Humidity |
|---|---|---|---|---|---|---|---|
| 0.600 | Fixed | | 0.000 | 0.000 | 1 | 0 | n.a. |

| Curvature | Threshold | Enhanced | Compute Crystallinity | Cristallinity - From | Cristallinity - To | %-Crystallinity |
|---|---|---|---|---|---|---|
| 1.000 | 1.000 | No | Yes | 5.000 | 80.000 | 20.9 % |

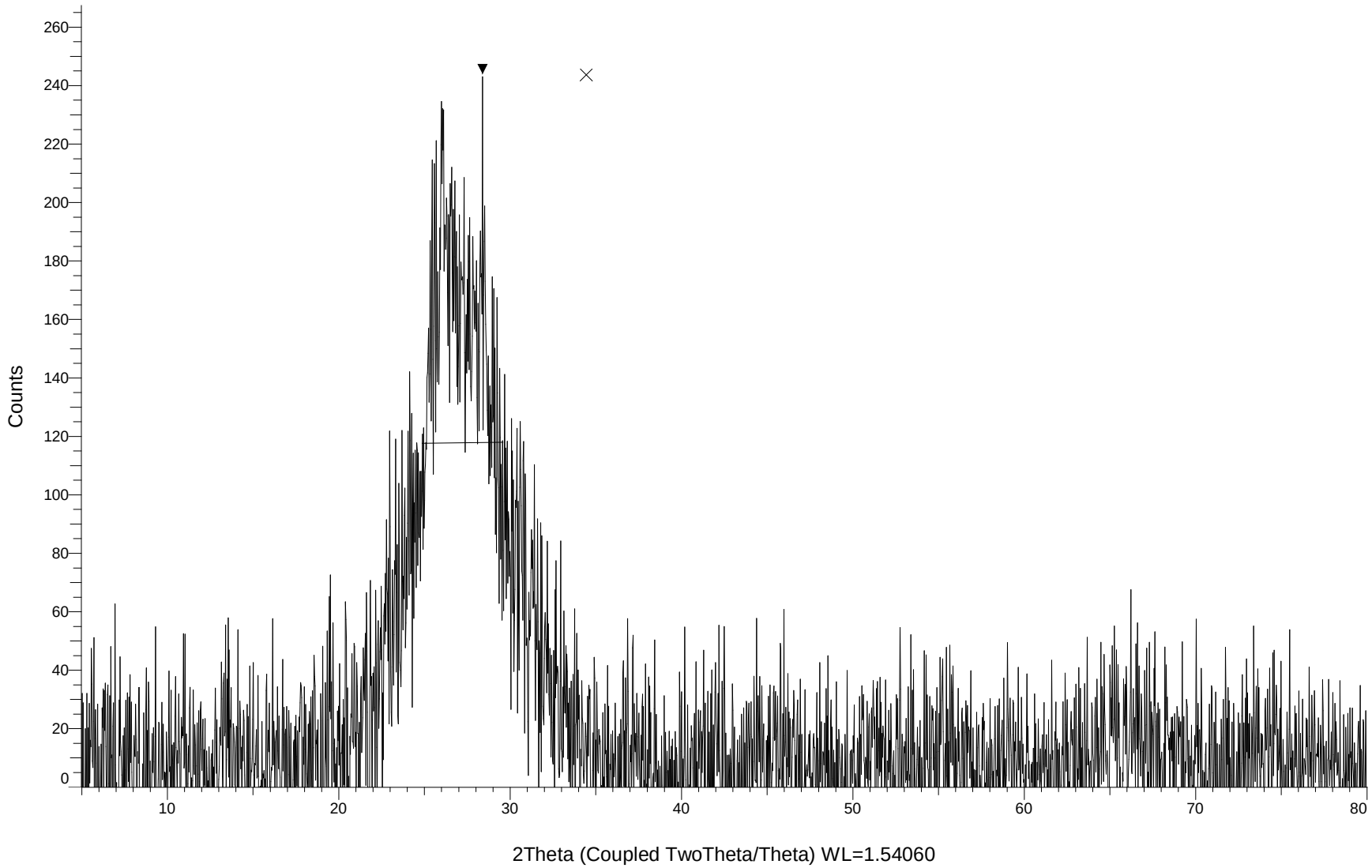
| %-Amorphous | Global Area | Reduced Area | Company Name | Operator Name | Comment |
|---|---|---|---|---|---|
| 79.1 % | 11666 | 2434 | | | |

| Creation Date/Time |
|---|
| 01-Jan-01 12:00:00 AM |

# Supporting Information, S11

# XRD Analysis Report for $UO_2S$ thin film dipped in 10 mM $AgNO_3$ for 24 hrs

## (Coupled TwoTheta/Theta)



# 2Theta

| Visible | Icon | Color | Index | Name | Parent | Sample Name | File Name | Scan Type |
|---|---|---|---|---|---|---|---|---|
| Yes | | | 1 | AG2S.raw | 2Theta | | AG2S.raw | Coupled TwoTheta/Theta |

| Scan Status | Start | End | Step Size | Time per Step | Temperature | Time Started | Goniometer radius |
|---|---|---|---|---|---|---|---|
| Completed | 5.000 | 80.000 | 0.030 | 0.5 | 25 (Room) | 8.0 | 250.0 |

| 2-theta | Theta | Chi | Phi | X-Drive | Y-Drive | Z-Drive | Aux1 | Aux2 | Aux3 | Anode | kα1 | kα2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.000 | 2.500 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Cu | 1.54060 | 1.54439 |

| kα2 Ratio | kβ | Generator kV | Generator mA | Detector Name | Divergence Slit | Antiscatter Slit |
|---|---|---|---|---|---|---|
| 0.50000 | 1.39222 | 40.0 | 40.0 | Detector 1 | 1.200 | 0.600 |

| Slit Mode | Simul. Slit Mode | X-Offset | Displacement | Y-Scale Factor | Y-Offset | Humidity | Curvature |
|---|---|---|---|---|---|---|---|
| Fixed | | 0.000 | 0.000 | 1 | 0 | n.a. | 1.000 |

| Threshold | Enhanced | Compute Crystallinity | Cristallinity - From | Cristallinity - To | %-Crystallinity |
|---|---|---|---|---|---|
| 1.000 | No | Yes | 5.000 | 80.000 | 17.4 % |

| %-Amorphous | Global Area | Reduced Area | Company Name | Operator Name | Comment |
|---|---|---|---|---|---|
| 82.6 % | 20027 | 3479 | | | |

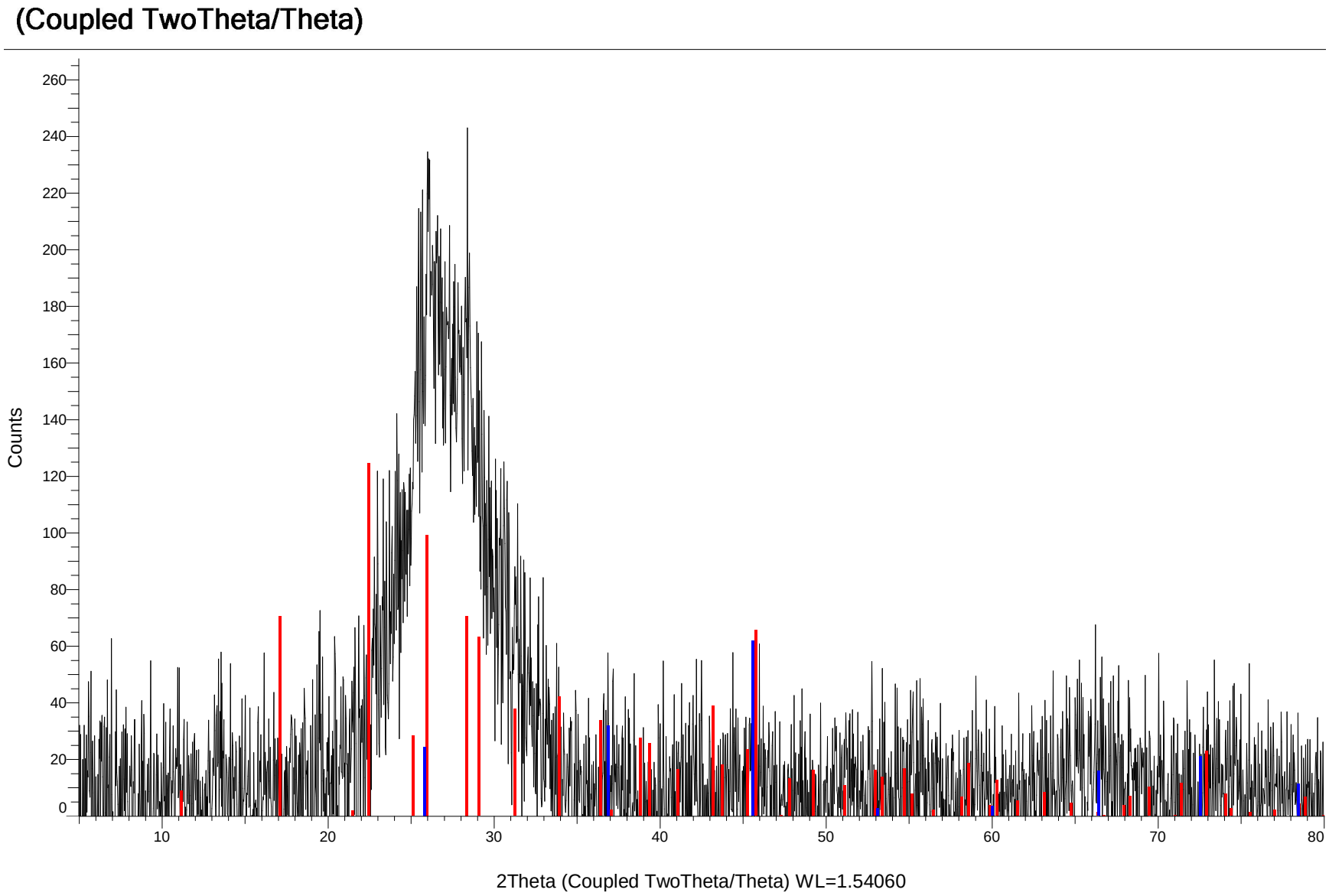
| Creation Date/Time |
|---|
| 01-Jan-01 12:00:00 AM |

# Area List #7

| Visible | Icon | Color | Index | Name | Parent | Scan | Left Angle | Right Angle | Left Int. |
|---|---|---|---|---|---|---|---|---|---|
| Yes |  |  | 1 | [5.000 - 80.000] | Area List #7 | AG2S.raw | 5.000 | 80.000 | 1399 |

| Right Int. | Obs. Max | d (Obs. Max) | Gross Int. | Net Height | FWHM | Chord Mid. | d (Chord Mid.) | I. Breadth |
|---|---|---|---|---|---|---|---|---|
| 406 | 28.397 | 3.14046 | 1723 | 634 | 5.026 | 27.464 | 3.24504 | -16.145 |

| Gravity C. | d (Gravity C.) | Raw Area | Net Area | C. Size | K | Instr. Width | Use I. Breadth |
|---|---|---|---|---|---|---|---|
| 21.717 | 4.08902 | 57436 | -10236 | 18.1 | 1.000 | 0.000 | No |



# Pattern: PDF 03-065-4429 Radiation: 1.54060 Quality: Indexed

| | |
|---|---|
| **Formula** | Ag2 S |
| **Name** | Silver Sulfide |
| **Name (mineral)** | |
| **Name (common)** | β-Ag2 S |

| | |
|---|---|
| **Lattice:** | Cubic |
| **S.G.:** | Im-3m (229) |

| | |
|---|---|
| **Mol. weight =** | 247.8 |
| **Volume [CD] =** | 115.71 |
| **Dx =** | 7.11 |
| **Dm =** | |
| **I/Icor =** | 3.450 |

| | | | |
|---|---|---|---|
| **a =** | 4.87300 | **alpha =** | |
| **b =** | | **beta =** | |
| **c =** | | **gamma =** | |
| **a/b =** | 1.00000 | Z = | 2 |
| **c/b =** | 1.00000 | | |

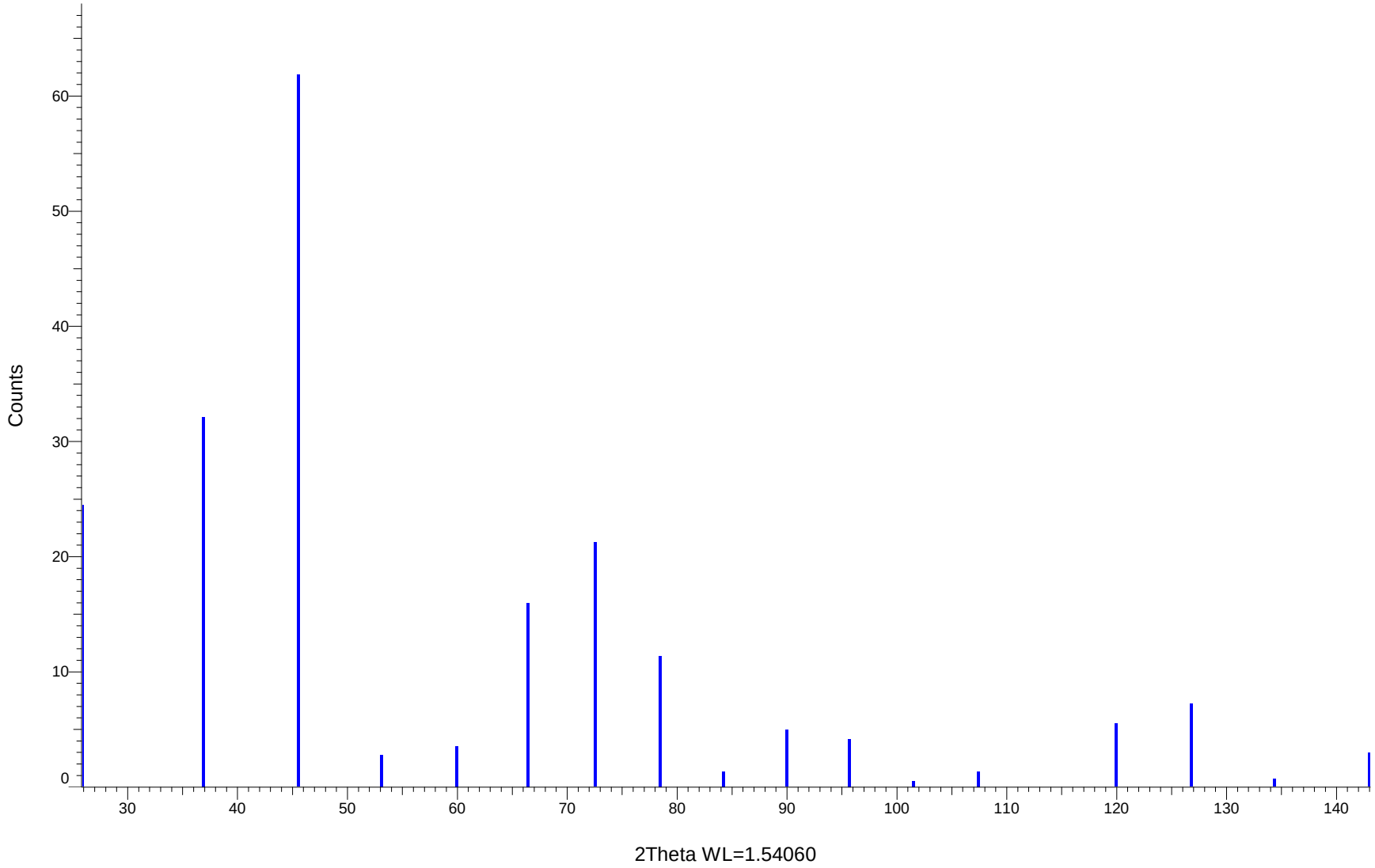
NIST M&A collection code: L 1106 43146 06
Sample Preparation: grown at 550C in the stability field of the bcc β-form, twinned upon cooling through the cubic monoclinic transformation at 177C
Calculated Pattern Original Remarks: high-temperature phase stable above 450 K. structure refined at 533 K
Temperature Factor: TF was not given, B set to 1.000 for calc
Temperature of Data Collection: 260 C
Minor Warning: Magnitude of e.s.d. on cell dimension is >1000 ppm. No Rfactor reported/abstracted
Unit Cell Data Source: Single Crystal

Structure
Publication: J. Solid State Chem.
Detail: volume 31, page 69 (1980)
Authors: Cava, R. J., Reidinger, F., Wuensch, B. J.
Primary Reference
Publication: Calculated from NIST using POWD-12++

| | | | |
|---|---|---|---|
| **Radiation:** | CuKα1 | **Filter:** | Not specified |
| **Wavelength:** | 1.54060 | **d-spacing:** | |
| **SS/FOM:** | 999.9 (0.0004,17) | | |

| d | 2θ | I | h | k | l |
|---|---|---|---|---|---|
| 3.44573 | 25.835 | 395 | 1 | 1 | 0 |
| 2.43650 | 36.861 | 519 | 2 | 0 | 0 |
| 1.98939 | 45.561 | 999 | 2 | 1 | 1 |
| 1.72287 | 53.116 | 45 | 2 | 2 | 0 |
| 1.54098 | 59.984 | 57 | 3 | 1 | 0 |
| 1.40671 | 66.404 | 258 | 2 | 2 | 2 |
| 1.30236 | 72.522 | 343 | 3 | 2 | 1 |
| 1.21825 | 78.440 | 184 | 4 | 0 | 0 |
| 1.14858 | 84.235 | 22 | 4 | 1 | 1 |
| 1.08964 | 89.971 | 80 | 4 | 2 | 0 |
| 1.03893 | 95.708 | 67 | 3 | 3 | 2 |
| 0.99470 | 101.503 | 8 | 4 | 2 | 2 |
| 0.95567 | 107.419 | 22 | 4 | 3 | 1 |
| 0.88968 | 119.951 | 89 | 5 | 2 | 1 |
| 0.86143 | 126.814 | 117 | 4 | 4 | 0 |
| 0.83571 | 134.360 | 11 | 5 | 3 | 0 |
| 0.81217 | 143.046 | 48 | 4 | 4 | 2 |

# PDF 03-065-4429



# Pattern: PDF 01-075-6838 Radiation: 1.54060 Quality: Hypothetical

| | |
|---|---|
| **Formula** | Ag2 S |
| **Name** | Silver Sulfide |
| **Name (mineral)** | |
| **Name (common)** | α`-Ag2 S |

| | | | |
|---|---|---|---|
| **Lattice:** | Monoclinic | **Mol. weight =** | 247.8 |
| **S.G.:** | P21 (4) | **Volume [CD] =** | 228.2 |
| | | **Dx =** | 3.61 |
| | | **Dm =** | |
| | | **I/Icor =** | 4.750 |

| | | | |
|---|---|---|---|
| **a =** | 4.20000 | **alpha =** | |
| **b =** | 6.86000 | **beta =** | 125.260 |
| **c =** | 9.70000 | **gamma =** | |
| **a/b =** | 0.61224 | **Z =** | 2 |
| **c/b =** | 1.41399 | | |

ANX: A2X
ICSD Collection Code: 98454
Hypothetical Structure: Structure calculated theoretically
Calculated Pattern Original Remarks: Cell in other P1211-setting: c`= 8.043, beta`= 100.02. Improbable structure, cf. 44507, 30445
Minor Warning: No e.s.d reported/abstracted on the cell dimension
Unit Cell Data Source: Powder Diffraction

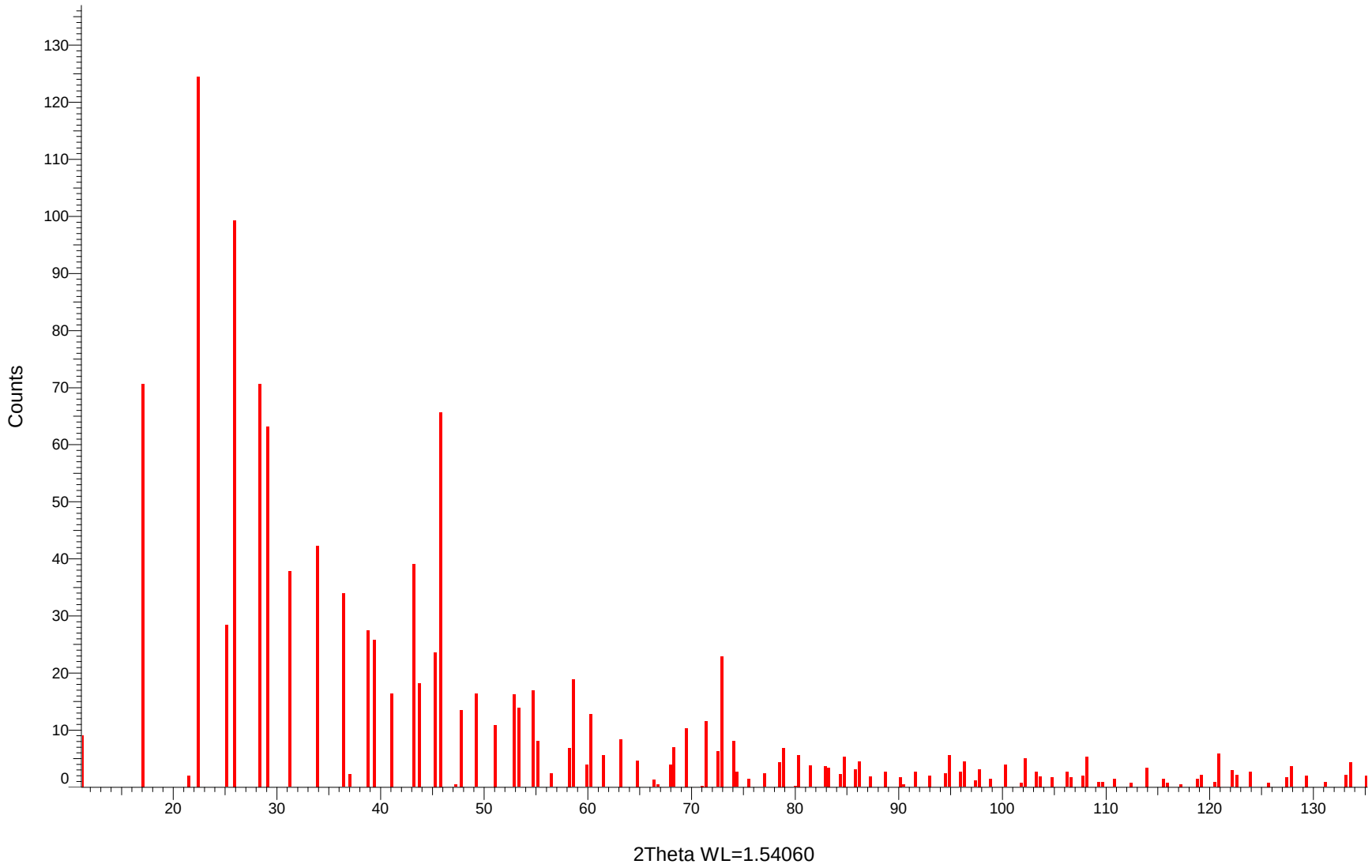
Structure
Publication: Solid State Ionics
Detail: volume 158, page 167 (2003)
Authors: Kashida, S., Watanabe, N., Hasegawa, T., Iida, H., Mori, M., Savrasov, S.
Primary Reference
Publication: Calculated from ICSD using POWD-12++

| | | | |
|---|---|---|---|
| **Radiation:** | CuKα1 | **Filter:** | Not specified |
| **Wavelength:** | 1.54060 | **d-spacing:** | |
| **SS/FOM:** | 291.7 (0.0015,69) | | |

| d | 2θ | I | h | k | l | d | 2θ | I | h | k | l |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.92045 | 11.162 | 73 | 0 | 0 | 1 | 1.27921 | 74.051 | 64 | -3 | 2 | 5 |
| 5.18545 | 17.086 | 567 | 0 | 1 | 1 | 1.27921 | 74.051 | 64 | -2 | 2 | 7 |
| 4.13591 | 21.468 | 16 | -1 | 0 | 1 | 1.27384 | 74.416 | 21 | 1 | 5 | 0 |
| 3.95980 | 22.435 | 999 | -1 | 0 | 2 | 1.25767 | 75.538 | 12 | 2 | 3 | 1 |
| 3.95980 | 22.435 | 999 | 0 | 0 | 2 | 1.25767 | 75.538 | 12 | -1 | 5 | 3 |
| 3.54197 | 25.122 | 228 | -1 | 1 | 1 | 1.23696 | 77.032 | 19 | -3 | 0 | 7 |
| 3.42974 | 25.958 | 797 | -1 | 1 | 2 | 1.23696 | 77.032 | 19 | -1 | 2 | 7 |
| 3.42974 | 25.958 | 797 | 0 | 1 | 2 | 1.21743 | 78.503 | 35 | -3 | 1 | 7 |
| 3.14753 | 28.332 | 567 | -1 | 0 | 3 | 1.21743 | 78.503 | 35 | 0 | 5 | 3 |
| 3.14753 | 28.332 | 567 | 0 | 2 | 1 | 1.21259 | 78.877 | 55 | -2 | 0 | 8 |
| 3.06751 | 29.087 | 507 | 1 | 1 | 0 | 1.21259 | 78.877 | 55 | 2 | 4 | 0 |
| 2.86039 | 31.245 | 303 | -1 | 1 | 3 | 1.19866 | 79.977 | 1 | 1 | 0 | 5 |
| 2.64020 | 33.926 | 339 | 1 | 0 | 1 | 1.19866 | 79.977 | 1 | 1 | 4 | 3 |
| 2.64020 | 33.926 | 339 | -1 | 2 | 1 | 1.19413 | 80.342 | 45 | -3 | 3 | 4 |
| 2.46392 | 36.436 | 272 | 1 | 1 | 1 | 1.19413 | 80.342 | 45 | -1 | 5 | 4 |
| 2.46392 | 36.436 | 272 | 0 | 1 | 3 | 1.18072 | 81.445 | 30 | -3 | 3 | 5 |
| 2.42519 | 37.039 | 18 | -1 | 0 | 4 | 1.18072 | 81.445 | 30 | 1 | 1 | 5 |
| 2.42519 | 37.039 | 18 | 1 | 2 | 0 | 1.16354 | 82.910 | 29 | -3 | 2 | 7 |
| 2.31888 | 38.803 | 221 | -1 | 2 | 3 | 1.16354 | 82.910 | 29 | -3 | 2 | 1 |
| 2.28635 | 39.378 | 207 | -1 | 1 | 4 | 1.15947 | 83.266 | 27 | -2 | 4 | 6 |
| 2.19694 | 41.051 | 132 | 0 | 3 | 1 | 1.15947 | 83.266 | 27 | -1 | 4 | 6 |
| 2.09215 | 43.208 | 313 | 1 | 2 | 1 | 1.14719 | 84.361 | 18 | 2 | 1 | 3 |
| 2.09215 | 43.208 | 313 | 0 | 2 | 3 | 1.14719 | 84.361 | 18 | -1 | 3 | 7 |
| 2.06814 | 43.735 | 146 | -2 | 0 | 2 | 1.14326 | 84.718 | 43 | 2 | 3 | 2 |
| 2.06814 | 43.735 | 146 | 1 | 0 | 2 | 1.14326 | 84.718 | 43 | -2 | 5 | 2 |
| 2.00117 | 45.278 | 189 | -2 | 1 | 3 | 1.13160 | 85.799 | 25 | 1 | 2 | 5 |
| 2.00117 | 45.278 | 189 | -1 | 3 | 1 | 1.13160 | 85.799 | 25 | 0 | 6 | 1 |
| 1.98011 | 45.787 | 527 | -2 | 0 | 4 | 1.12765 | 86.173 | 36 | -3 | 1 | 8 |
| 1.98011 | 45.787 | 527 | 0 | 0 | 4 | 1.12765 | 86.173 | 36 | -1 | 1 | 8 |
| 1.92092 | 47.282 | 3 | -2 | 0 | 1 | 1.11647 | 87.251 | 15 | 0 | 1 | 7 |
| 1.92092 | 47.282 | 3 | -1 | 0 | 5 | 1.11647 | 87.251 | 15 | -1 | 5 | 5 |
| 1.90253 | 47.767 | 108 | -2 | 1 | 4 | 1.10200 | 88.694 | 22 | 2 | 2 | 3 |
| 1.90253 | 47.767 | 108 | 1 | 3 | 0 | 1.10200 | 88.694 | 22 | -1 | 6 | 1 |
| 1.84970 | 49.221 | 131 | -2 | 1 | 1 | 1.08790 | 90.155 | 14 | -3 | 3 | 7 |
| 1.84970 | 49.221 | 131 | -1 | 1 | 5 | 1.08790 | 90.155 | 14 | -3 | 3 | 1 |
| 1.78592 | 51.103 | 87 | -2 | 0 | 5 | 1.08464 | 90.501 | 3 | -3 | 2 | 8 |
| 1.78592 | 51.103 | 87 | -2 | 2 | 3 | 1.08464 | 90.501 | 3 | 1 | 6 | 0 |
| 1.72848 | 52.930 | 130 | -2 | 1 | 5 | 1.07461 | 91.585 | 21 | 0 | 2 | 7 |
| 1.72848 | 52.930 | 130 | 0 | 3 | 3 | 1.07461 | 91.585 | 21 | -1 | 6 | 3 |
| 1.71500 | 53.379 | 111 | 2 | 0 | 0 | 1.06164 | 93.033 | 16 | -2 | 1 | 9 |
| 1.71500 | 53.379 | 111 | 0 | 4 | 0 | 1.06164 | 93.033 | 16 | 1 | 5 | 3 |
| 1.67599 | 54.724 | 135 | -2 | 2 | 1 | 1.04918 | 94.478 | 19 | 1 | 6 | 1 |
| 1.67599 | 54.724 | 135 | -1 | 2 | 5 | 1.04918 | 94.478 | 19 | 0 | 6 | 3 |
| 1.66367 | 55.163 | 64 | 2 | 1 | 0 | 1.04602 | 94.853 | 44 | -3 | 4 | 6 |
| 1.66367 | 55.163 | 64 | -1 | 3 | 4 | 1.04602 | 94.853 | 44 | -3 | 4 | 2 |
| 1.62810 | 56.475 | 19 | 1 | 1 | 3 | 1.03709 | 95.933 | 21 | -4 | 1 | 5 |
| 1.58400 | 58.195 | 55 | -2 | 2 | 5 | 1.03709 | 95.933 | 21 | 0 | 5 | 5 |
| 1.58400 | 58.195 | 55 | 0 | 0 | 5 | 1.03398 | 96.316 | 36 | -4 | 1 | 6 |
| 1.57374 | 58.612 | 151 | -1 | 0 | 6 | 1.03398 | 96.316 | 36 | -4 | 0 | 4 |
| 1.57374 | 58.612 | 151 | -1 | 4 | 2 | 1.02534 | 97.400 | 9 | -4 | 0 | 7 |
| 1.54347 | 59.877 | 31 | -2 | 3 | 3 | 1.02534 | 97.400 | 9 | -2 | 2 | 9 |
| 1.54347 | 59.877 | 31 | 0 | 1 | 5 | 1.02253 | 97.759 | 25 | -3 | 3 | 8 |
| 1.53378 | 60.294 | 102 | -2 | 1 | 6 | 1.02253 | 97.759 | 25 | -1 | 3 | 8 |
| 1.53378 | 60.294 | 102 | -2 | 3 | 2 | 1.01413 | 98.852 | 11 | -4 | 1 | 7 |
| 1.50584 | 61.533 | 44 | 2 | 0 | 1 | 1.01413 | 98.852 | 11 | 0 | 3 | 7 |
| 1.50584 | 61.533 | 44 | 1 | 2 | 3 | 1.00326 | 100.313 | 31 | -4 | 2 | 5 |
| 1.47082 | 63.164 | 67 | 2 | 1 | 1 | 1.00326 | 100.313 | 31 | -2 | 6 | 3 |
| 1.47082 | 63.164 | 67 | -1 | 3 | 5 | 0.99263 | 101.795 | 5 | -4 | 1 | 3 |
| 1.43813 | 64.773 | 37 | 0 | 2 | 5 | 0.99263 | 101.795 | 5 | -1 | 1 | 9 |
| 1.43813 | 64.773 | 37 | 1 | 4 | 1 | 0.99005 | 102.163 | 40 | -4 | 0 | 8 |
| 1.40747 | 66.363 | 10 | -2 | 3 | 5 | 0.99005 | 102.163 | 40 | -2 | 4 | 8 |
| 1.40022 | 66.752 | 3 | -3 | 0 | 4 | 0.98247 | 103.264 | 22 | -4 | 2 | 7 |
| 1.40022 | 66.752 | 3 | -1 | 4 | 4 | 0.98247 | 103.264 | 22 | -1 | 6 | 5 |
| 1.37875 | 67.931 | 31 | -3 | 0 | 5 | 0.97995 | 103.637 | 15 | -3 | 5 | 4 |
| 1.37875 | 67.931 | 31 | 2 | 2 | 1 | 0.97995 | 103.637 | 15 | 1 | 5 | 4 |
| 1.37187 | 68.319 | 56 | -3 | 1 | 4 | 0.97249 | 104.763 | 14 | -2 | 3 | 9 |
| 1.37187 | 68.319 | 56 | 1 | 1 | 4 | 0.97249 | 104.763 | 14 | -3 | 5 | 3 |
| 1.35187 | 69.473 | 83 | -3 | 1 | 5 | 0.96290 | 106.256 | 21 | -4 | 2 | 3 |
| 1.35187 | 69.473 | 83 | 0 | 5 | 1 | 0.96290 | 106.256 | 21 | -2 | 6 | 5 |
| 1.32625 | 71.015 | 2 | -1 | 0 | 7 | 0.96047 | 106.644 | 14 | -3 | 0 | 10 |
| 1.32625 | 71.015 | 2 | -2 | 4 | 3 | 0.96047 | 106.644 | 14 | 3 | 0 | 2 |
| 1.32015 | 71.393 | 93 | -3 | 0 | 6 | 0.95349 | 107.777 | 16 | -4 | 3 | 5 |
| 1.32015 | 71.393 | 93 | 1 | 4 | 2 | 0.95349 | 107.777 | 16 | 3 | 3 | 1 |
| 1.30222 | 72.531 | 50 | -1 | 1 | 7 | 0.95130 | 108.139 | 43 | -4 | 3 | 6 |
| 1.30222 | 72.531 | 50 | -1 | 5 | 1 | 0.95130 | 108.139 | 43 | 0 | 7 | 2 |
| 1.29630 | 72.915 | 184 | -2 | 3 | 6 | 0.94449 | 109.287 | 7 | -4 | 0 | 9 |
| 1.29630 | 72.915 | 184 | -2 | 4 | 4 | 0.94449 | 109.287 | 7 | 1 | 6 | 3 |
| 1.27921 | 74.051 | 64 | -3 | 2 | 5 | 0.94228 | 109.667 | 7 | 2 | 3 | 4 |

| d | 2θ | I | h | k | l |
|---|---|---|---|---|---|
| 0.94228 | 109.667 | 7 | 2 | 3 | 4 |
| 0.94228 | 109.667 | 7 | 1 | 7 | 0 |
| 0.93568 | 110.823 | 11 | -4 | 1 | 9 |
| 0.93568 | 110.823 | 11 | -1 | 7 | 3 |
| 0.92708 | 112.380 | 6 | 2 | 0 | 5 |
| 0.92708 | 112.380 | 6 | 0 | 6 | 5 |
| 0.91874 | 113.949 | 27 | -4 | 3 | 3 |
| 0.91874 | 113.949 | 27 | 1 | 7 | 1 |
| 0.91046 | 115.571 | 12 | -4 | 2 | 9 |
| 0.91046 | 115.571 | 12 | -4 | 0 | 1 |
| 0.90861 | 115.942 | 6 | -4 | 3 | 8 |
| 0.90861 | 115.942 | 6 | -1 | 7 | 4 |
| 0.90256 | 117.180 | 4 | -4 | 1 | 1 |
| 0.90256 | 117.180 | 4 | 1 | 5 | 5 |
| 0.89490 | 118.804 | 12 | -4 | 4 | 5 |
| 0.89490 | 118.804 | 12 | 2 | 2 | 5 |
| 0.89303 | 119.212 | 17 | -1 | 0 | 10 |
| 0.89303 | 119.212 | 17 | 1 | 4 | 6 |
| 0.88744 | 120.455 | 7 | 2 | 5 | 3 |
| 0.88744 | 120.455 | 7 | -2 | 7 | 3 |
| 0.88555 | 120.883 | 47 | -4 | 1 | 10 |
| 0.88555 | 120.883 | 47 | 2 | 4 | 4 |
| 0.88000 | 122.170 | 23 | -4 | 2 | 1 |
| 0.88000 | 122.170 | 23 | -3 | 6 | 5 |
| 0.87823 | 122.589 | 17 | -3 | 5 | 8 |
| 0.87823 | 122.589 | 17 | 3 | 5 | 0 |
| 0.87283 | 123.898 | 21 | -4 | 3 | 9 |
| 0.87283 | 123.898 | 21 | -3 | 1 | 11 |
| 0.86595 | 125.631 | 6 | -4 | 4 | 3 |
| 0.86595 | 125.631 | 6 | -1 | 6 | 7 |
| 0.85907 | 127.448 | 14 | -2 | 1 | 11 |
| 0.85907 | 127.448 | 14 | 2 | 3 | 5 |
| 0.85737 | 127.910 | 29 | -4 | 4 | 8 |
| 0.85737 | 127.910 | 29 | 4 | 0 | 0 |
| 0.85239 | 129.296 | 16 | -3 | 2 | 11 |
| 0.85239 | 129.296 | 16 | 3 | 2 | 3 |
| 0.84589 | 131.187 | 7 | -4 | 3 | 1 |
| 0.84589 | 131.187 | 7 | -2 | 5 | 9 |
| 0.83955 | 133.133 | 17 | -2 | 2 | 11 |
| 0.83955 | 133.133 | 17 | -3 | 6 | 7 |
| 0.83797 | 133.631 | 35 | -5 | 0 | 6 |
| 0.83797 | 133.631 | 35 | -3 | 4 | 10 |
| 0.83326 | 135.169 | 16 | -4 | 1 | 11 |
| 0.83326 | 135.169 | 16 | -5 | 1 | 7 |

# PDF 01-075-6838



# Pattern List #9

| Show | Icon | Color | Index | Name | Parent | Scan | Pattern # | Compound Name |
|---|---|---|---|---|---|---|---|---|
| Yes | | | 1 | PDF 01-075-6838 | Pattern List #9 | AG2S.raw | PDF 01-075-6838 | Silver Sulfide |
| Yes | | | 2 | PDF 03-065-4429 | Pattern List #9 | AG2S.raw | PDF 03-065-4429 | Silver Sulfide |

| Formula | Y-Scale | I/Ic DB | I/Ic User | S-Q | Added Reference | d x by | Scan WL | Wavelength |
|---|---|---|---|---|---|---|---|---|
| Ag2 S | 51.2210 % | 4.750 | | 59.38 % | | 1.0000 | Yes | 1.54060 |
| Ag2 S | 25.4469 % | 3.450 | | 40.62 % | | 1.0000 | Yes | 1.54060 |

| System | Space Group | a | b | c | alpha | beta | gamma | Z | Volume | Density |
|---|---|---|---|---|---|---|---|---|---|---|
| Monoclinic | P21 (4) | 4.20000 | 6.86000 | 9.70000 | | 125.260 | | 2 | 228.20 | 3.606 |
| Cubic | Im-3m (229) | 4.87300 | | | | | | 2 | 115.71 | 7.112 |

| Cell Tuned | F (N) |
|---|---|
| No | F30= 291.7(0.0015, 69) |
| No | F17= 999.9(0.0004, 17) |