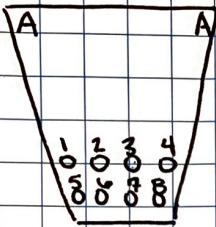


STXM-NEXAFS SOCRATES 9/24 - 9/28

ex.



Sample Holders (SH)

8 Sample holders A-H. Labeled in upper corners with Sharpie. Each sample holder has 8 holes 1-8, not labeled.

* = high priority

all stage 1

| Sample Holder | Hole location | Sample # | Stage | Notes |
|---|---------------|----------------|-------|--|
| A | ✓ 3 | RF15-H | 1 | Bad samp; precip |
| A | ✓ 4 | RF15-G | 1 | 500 ft. Low vol. |
| A | ✓ 1 | RF14-C | | Below cloud, low volatility (500ft) |
| B | ✓ 3 | * RF14-B | | In cloud |
| B | ✓ 4 | RF13-AI | | Below cloud, low winds, high bio? |
| B | 1 | * RF13-H | | In cloud, high bio(?) |
| C | 3 | RF13-G | | below cloud 500 ft. In Rift, low winds. |
| C | 4 | RF13-F | | Below cloud, low wind. Diff. aerosol than G |
| C | 2 | * RF12-D | | Below cloud, near ship. not blank |
| D | 1 | * RF12-C | | In cloud, above ship |
| E | 3 | RF12-A | | Above cloud |
| E | 4 | RF08-G | | In cloud, not blank |
| Above this line are high priority samples. Below are lower priority | | | | |
| E | 2 | RF10-F | | Below cloud |
| E | 1 | RF10-H | | Below cloud |
| F G | 2 only ✓ 2 | * K8 IMP RF-08 | | INP FROM PAUL |
| F G | 3 | * MB | | INP. SHIP 1/26/2018 |
| F G | 4 | M10 | | INP. SHIP. Broken 2/18/2018 |
| F G | 1 | RF-15 | | Blank. (unused on impactor grid) |
| F | 3 | RF07-F | | Below cloud but not in BL. Heated |
| F | 4 | RF07-D | | Below cloud. Heated |
| F | 2 | RF14-A | | Above cloud |
| F | 1 | RF | | Above cloud |

Samplers were transferred in a laminar flow hood in ALS Bio lab 120 (Bldg 15).

INP sample info

K8: RFD8

K10: BROKEN RFD6

M8: 1/26 SHIP

M10: 2/18 SHIP

11809251

8:27 → Loaded SH A into chamber

Updated procedure: Pump down to 15 in Hg, then open green valve to fill with He (black vacuum pump can be changed) till ~5. Repumped down to 15 and fill to 5 again on gauge & 640 torr

- 390 is a good driving energy
- When big x or y movements are made, reset interferometer
 - red lights won't be on

↙ on main panel. Micro cont

- For first scan, the plate was at $z=1000$. too far
 - moved $z=500$. still out of focus
 - A_0 changed to 290 from 368, ~~was~~ decreased distance from zonal plate

- Look at particles ~ between 0.5-10 μm

Focusing → Focus scan. Before next sample scan, put cursor on focusing object, click 'sample to cursor', and then 'sample to cursor coarse'

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Image Summary p. 1 of -

Sample RFIS-H (dirty in cloud)

180925001

002

003

004

overview of window

005

zoom on corner 3 (200 μm x 200 μm) @ 390eV

006

" " " " @ 290eV

007

zoom " " " (50 μm x 5 μm) @ 290eV

008

two particles rescan

009

010

011

line scan on particle

Sample RFIS-G

180925013

overview of window 2mm x 2mm

014

015

zoom on 4

016

017

particle zoom 5 μm x 5 μm

018

Cdiff on particle near 4

STACK

019

①

020

stack on particle

021

zoom on 3

022

023

zoom with edge

024

025

026

027

zoom with edge

②

028

particle stack - Cdiff on particle

029

stack on particle

030

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Sample RE15-G (cont.)

180925031

032 zoom around 2 particles

033 Cdiff on particle - no c.

034

035

036

037 Cdiff on 4 particles

038 Cdiff on 2 particles (high res)

039 focus on particle (bottom particle in 038)

③

040 stack on same particle (image 038)

041 map on corner "2"

042 Cdiff on 3 particles on the "2"

043 Zoom into bottom particle on 042

044 focus onto particle

045 ~~stack~~ Cdiff particle 043

④

046 stack of particle 043 -

047 Cdiff on 1 particle - upper right of 3

⑤

048 stack of upper right particle (slightly irregular)

049 zoom into 3 particles near 1 -

054 (050-53 troubleshooting interferometer) Matthew

→ zoom on middle small particle, point to point scan, Focus scan

55 - intermediate work.

56 - scan after focus - shows central particle w/ ring.

57 - Cdiff of 56.

⑥

58 - stack of 56

59 - ~~map~~ opened 21 and zoomed into green square (32 x 29 μm)

60 - Cdiff on 59 (5 particles)

61 - zoom into left particle (3.4 x 4.3 μm)

look different before + after focusing. volatized

62 - zoomed into 61 (2.3 x 2.1 μm)

63 - FOCUS SCAN - not the best gradient. Focused on particle edge

64 - Cdiff, image point by point (1.5 x 1.2 μm)65 - stack of 64 (1.5 x 1.2 μm)66 - back to image 59 and zoomed into 2 particles with 5 x 5 μm box67 - zoomed in on lower right particle (1.5 x 1.5 μm)

68 - FOCUS SCAN on 67. *don't check horizontal*

69 - Cdiffer on 67 Image point by point

70 - stack on 67 - 1.2 x 1.0 μm

⑧

9/25/2018

SAMPLE RF15-G (cont)

- Image → 80925071 → opened 59 and zoomed in on last particle 4.9×4.4
 72: zoomed in on particle. LOOKS FUZZY 1.1×1.1
 STACK 73: C-diff on 72. Image point by point. - faint, but detectable @ diff signal
 (9) 74: stack on this particle $\sim 600 \times 400$ on STM image, $\sim 450 \times 300$ on AXIS C-diff
 this may not be sensait? lighter, smaller, for comparison
 75: ~~open 15 (#4) and zoom in on larger particle~~
 75: 50×50 um by top of #4
 76: 9.9×8.8 um. Directly below (in reference to image) top of 4
 77: FOCUS SCAN + image after (didn't save FOCUS) (9×8 um)
 78: C diff (6.7×6.5 um)
 (10!) 79: Stack ~~78 parameters~~ Interferometer light going on and off.
 78 Parameters,

SAMPLE RF 14-C

 - Below Cloud Flight 14

Coarse z = 1000, Coarse x = -7500, Coarse y = 6053 (as prior window) ^{sample}
 2 mm scan to find window - took a while, but works.

Big pile under jet! checked location visually before moving
 coarse z to 500, check OSA visually again
 center of window $\sim -7456, 6407$

80: ?

81: 1st macro overview82: 800×800 um. Full window.83: 200×200 scan of #1 & window edge -

about early to focus on window edge.

Auto focus moved z to 502, manually set to 510 because still way
 out of focus - but not good "V" pattern

84: z = 502, same area

85: z = 510 " "

86: z = 530 " " still very fuzzy - try to focus on particle instead

87: new area w/ fuzzy particles in same region - then accidentally moved

88: - try 600 for z, back near 1 again to x = 15 somehow.

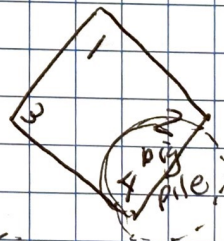
89: - z = 560 - no better or worse than earlier ones, back to 500 (90)

91: - tried w/ diagonal arrow, long one - still no V

92: - smaller arrow - still no V, also not much contrast.

Go to diff area - data acquisition error

93: - Go to 390 eV to see if makes difference



~~No more trouble~~

94 - $z = 490$ near z

95 - $z = 480$

96 focus scan x & y - autofocus set $z = 471$

97 focusing on smaller box, z still at $z = 471$
New focus scan brought us to 461

98 scan same area.

99 opened 83 and did $200 \times 200 \mu\text{m}$ sample scan, $z = 461$.

100 Refocused and sample scan of 99 $z = 448$

101 Zoomed into 100, lower right particles (70×59)

102 Refocused, new $z = 440$. Image scan, same parameters as 101

103 Zoomed into right particle of 102. $24 \times 27 \mu\text{m}$

104 103 was slightly shifted, moved x slightly

105 $z = 430$. Slightly clearer.

106 C-diff on 105 parameters

~~107 Stack on this part - 107?~~

QUESTIONS FOR Matthew

- Lowest z ? - Turn knob on PMT to turn off?
- Troubleshooting focusing problems
- Interferometer cuts in and out... why? Concerning?
- Coarse x & reading often do (on green and white display) often doesn't match center PBS. Concerning?
- IF out of focus, how much is a stack worth it
- Follow up: How if so, how would you define out of focus?

STACK

① 180926000 stack on 105 image - maybe out of focus. Large $\sim 5 \mu\text{m}$
01 opened 99, ($z = 410$), energy = 320, 150×15 - point by point. 196×192 . MUCH better!

002 - Zoom in on upper left w/ #1 and bit of edge to focus - now at $z = 402$, still no hourglass

003 zoom on 2 particles on 1, plus a few small ones $32 \times 32 \mu\text{m}$.

004 zoom on one just inside lines of 1 10×10 box, focus on particle

005 FOCUS SCAN (didn't work) - noisy

006 C-diff on particle. NO detectable difference

007 $z = 390$, opened 004 and followed similar parameters

008 Refocused, $z = 382$, C-diff on 007 (9.7×9.7) ← same particle, but now with focus, get c-Difference

② 009 Stack on 008
Now back to 002 & zoom in on area below #1

010 - box but shifted so zoom out again

011 - 50×50 , edge of 1 up top left

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07

RF14-C Continued

- 180926012 Focus Scan on #1
 013 Cdiff on 2 particle
 014 -crashed, program restart
 015 Cdiff on 1 particle - aborted, missed
 016 Aborted, still missed
 017 Refinding position
 018 Focus Scan
 019 Back in position on #1
 020
 021
 022 Re zoom on particle
 023 Focus on particle
 024 Focus on particle
 025 Cdiff on particle
 ③ 026 Stack on smallest particle
 027 Cdiff on nearby particle
 028 Focus scan
 ④ 029 Stack on square particle
 030 New overview image @ 320 eV
 031 Cdiff on small particle
 032 Focus scan
 033 Repeat Cdiff
 ⑤ 034 Stack on particle
 035 New particle overview
 036 Focus scan
 ⑥ 037 Cdiff on new particle
 038 Stack on particle
 039
 040 ~~Focus~~ Survey near Particle
 041
 042 Focus Scan on Particle
 043 Cdiff on Particle
 ⑦ 044 Stack on ~900nm Particle
 045 Survey 25um x 25um w/ 300pts
 046 Cdiff on Particle
 047 Focus on particle
 048 - nothing program crash
 049 - find particle (we lost it after crash)
 050 - zoom on particle

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08

RF14-C continued

⑧ 180926051 Focus Scan
052 Cdiff on particle
053 Stack on particle
054
055 Overview survey - about, interferometer
056 Overview survey
057
058
059 ↑

⑨ 060 focus on particle
061 Stack on particle
062
063 zoom survey on lower 1
064 Focus scan
065 zoom
066 Cdiff on 3 particles: 1 big + 2 small
067 Focus Scan
068 Cdiff
⑩ 069 Stack - maybe low/no C. but small. Aborted
070 Focus scan
071 Stack

8:21am Vent and changed filter holder
Sample holder B
Sample RF13-I in position 4

180926072 Scan Failed, Restarted with Reset Interferometer
073 Overview Scan 2mm x 2mm - missed window
074 Found window
Increased slit size to 60 from 30 to increase signal

075
076
077 Overview out of focus
078 Focus Scan all edge
079 Focus Scan

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RF13-I

09

- 180926 080 Focus scan w/ smaller range & steps
081 Rescan zoom #1 of overview
082 Focus scan on edge
083 Survey 50x50mm near #1
084 -
085 Survey 10x10mm near #1
086 focus on particle
087 - canceled Cdiff
088 - canceled Cdiff
089 - Cdiff on particle
090 -
091 - focus on particle
092 - image particle
① 093 - stack particle
094 - quick stack of large particle
095 - High res 50x50mm image around 1
096 - zoom into particle
097 - focus scan on particle
098 - Cdiff on particle
② 099 - stack on particle.
100 - high res image near 1 50x50mm
101 -
102 - image of particle
103 - focus of particle
104 - cdiff of particle
③ 105 - stack of particle
106 - zoom into new particle
107 - focus on ~~new~~ particle
108 - cdiff particle
④ 109 - stack particle
110 - 200mm x 200mm near 2
111 - ~~zoom~~ x 200mm on 2
112 - 200mm x 200mm on 2
113 - 50mm x 50mm region aborted
114 -
115 - 200mm x 200mm on 2
116 - 50mm x 50mm region aborted
117 - Focus on 2
118 - High res on 2
119 - zoom into particle

Point delay changed from ? \rightarrow 0.2

10

180926 120 - focusing on particle & program crash

121 - lost

122 - lost

123 - found particle again

124 - Cdiff on particle

⑤ 125 - Stack of particle

↳ 126 - ~~50x50 um~~ zoom on 2 stack

126 - 50x50 um range on 2

127

⑥ 128 - Cdiff on particle

129 - stack on particle

130 - ?

131 - ?

132 - opened 118 FD pick new particle 25x25 um box

133 - 8.5x8.5 zoom on particle

134 - refocus + same param as 133

135 - zoom (2x2 um)

136 - Cdiff on 135

near #2

⑦

137 - stack on 135 (looks like salt, crystal structure)

138 - opened 115 and did a $\approx 75 \times 75$ box on lower ~~part~~ part of 2

139 - ~~47x34~~ zoom on 2. Looking for small particles

140 - zoomed in on 2 particles, lower right (8x14 um)

141 - zoomed more.

142 - C-diff

143 - ~~145~~ ^{~5x5} um zoom on top particle.

144 - 25x2.5 zoom on particle

145 - zoom

near #2

⑧

146 - stack on particle (color corrector)

147 - opened 81 and did several $\sim 147 \times 147$ scans but screen was all black with white dots. 81 had bad coordinates

148 - 500x500 um survey to find 1 ~~area~~

149 - 200x200 um survey. Going in \oplus y direction of #1

150 - 75x75 um zoom

151 - 22x22 zoom. Shifted to the right of box

152 - Focused on particle + rescanned 151

153 - Focused on 3 points (5x12)

⑨

154 - stack on lower particle

155 - Image scan of 154

180926 - RF13I

180926156 - REFOCUS + ~~image~~ AREA OF 155

focus scan 50 pts - Z didn't change. 100 pts - good X - still Z little change
 did not take new image, move to smaller particle just above 155

So
 forward
 5HP
 for
 down

180926156 & 57 - images of smaller particle above

180927001 - 007 finding particle

008 - difference scan on 2 small particles

009 - focus scan on right particle.

(10)

010 - stack on right particle

011 -

012 - OSA scan - looks good

013 - Find particle on the left of image 008

014 - focus on particle

015 - center particle

(11)

016 - stack on particle

Sample RF14-B - in cloud, drop conc ~ 60/cc

017 - Searching for window.

018 - Abort image

019 - window image

020 - image of corner #2

021 - focus on #2

022 - focus on #2

023 - " "

024 - " "

025 - 150 x 150 um

026 - zoom in 20 x 20 mm

027 - zoom in 1 x 1 mm on particle on + Ae #2

028 - focus on particle

029 - Cdiff on particle

(1)

030 - stack on particle

031 - zoom in on particle

032 - ~~cdiff~~

033 - Cdiff

034 - focus

035 - Cdiff - no carbon

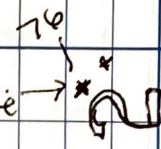

036 - new wred 50 x 50 mm by #2


037 - repeat image 36 but change from PointXpoint to lin.


Sample R14-B continued


- 180927038 - 3x3mm image of particle
 039 - focus on particle
 040 - Cdiff on particle
 ② 041 - Stack on small particle w/ 2 different sections
 042 - 5x5mm image of particle
 043 - Cdiff
 ③ 044 - ~~Stack on small particle~~ focus
 045 - stack on particle
 046 -
 047 - 50x50mm area near #2
 048 - focus on #2
 049 - focus on #2 again
 050 - 20x20mm zoom
 ④ 051 - Cdiff on particle
 052 - Stack on particle
 053
 054 - new 50x50mm image on #2
 055 - zoom in on particle
 056 - focus on particle
 ⑤ 057 - Cdiff on particle
 058 - Stack of particle
~~Also linescan~~
 059 - zoom on image
 060 - focus
 ⑥ 061 - Stack
 062 - linescan - doing linescans
 063 - ~~on~~ Cdiff
 064 - Cdiff on new particle on #2
 065 - focus scan
 ⑦ 066 - ~~stack~~ Cdiff.
 067 - linescan - point by point, 10ms, Auto Defocus
 100 points, .03step - Cdiff energies (2).
 068 - linescan w/ stack parameters 278, 30 etc.
 Dwell time 5ms, 50 points, Auto Defocus
 dark image Matthew says is carbon in system
 069 - try w/o auto defocus - same result - Aborted early

SAMPLE RF4B Cont.

- 180927070 - scan of $\frac{1}{2}$ enlarged. Working on particle 
- 071 - scan zoomed in on these 2
- 072 - cdiff on these 2 particles, zoomed in a little - didn't work, red
- 073 - repeat cdiff above - still dark - bad
- 074 - repeat cdiff. NO glitches this time. Particles pretty pale - do bottom left one
- 075 - image scan of bottom left particle 3x3 - interesting 

- ⑧ ~~076~~ - focus scan on this particle (not saved)
- ~~076~~ - aborted stack
- ~~077~~ - Stack on this particle - very interesting structure
- 077 chose not to line scan ~~due~~ to preserve for TEM.
- 078 ^{image} scan of upper right particle  of scan 71
- 079 cdiff on particle 78

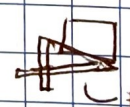
- ⑨ 080 stack particle 78
- 081 opened 47 and did 10x10 zoom, did focus on this particle - no real z change
- 082 - cdiff on particle in green box on ppt.
- 083 - image scan. $\approx 3 \times 3$ after focus & zoomed in - diff from 10x10 scan possible volatilization in center areas? 

- ⑩ 084 - STACK
- 085 - Line scan on same particle to get some structure - looks interesting 
- 086 - point x point line scan of membrane above 85 particle same ~~particles~~ parameters.

Sample position
 X 2370
~~X 1552~~
 Y 6548
 Z 573

SAMPLE RF-13 H. (position 1)
 in-cloud, possible bio? on holder

Initial movement:
 X = -7500
 Y = 6548
 Z = 1000 to start

- 087 - 2mm x 2mm scan of new sample - abort early w/ window
- 088 - zoom in scan $\sim 700 \mu\text{m}$ of window (682x658) @ z = 1000
- ~~089~~ - same at z = 700 - still out of focus - abort
- 089 " " z = 500 - lots of particles! focussed on edge $\rightarrow z = 478$
- 090 zoom in 100x100 around 4, focus
- 091 " 4" corner area still focusing
- 092 4 corner after focus, z = 407 (lower numbers for position 1?)
- 093 - zoom on top of 4 focus on larger particle - z 406 to 405 only.
- 094 $\sim 39 \times 31$ zoom top ~~set~~ of 4 - ~~edit~~
- 095 - cdiff on these group of 6  #4 on side

SAMPLE RF13-# continued

STACK 180927896 - scan of upper right particle 3.5×3.5 - (A) in ppt

- (1) 097 - stack on this particle
 098 - image scan of upper middle particle - 3×3 - (B) in ppt.
 099 - ~~image~~ ^{STACK} of same particle (B) in ppt
- (2) 100 - line scan of same
 101 - zoom into center of #4, ~~30×30~~ 75×75
 102 - centered on 4, set of 3 particles.
 103 - cdiff on these 3 - only upper left showed contrast, zoom in
 104 - image of upper left particle
- (3) 105 - stack of same particle
 106 - image of lower particle - group of 3 inside 4. (2.3×2.3)
 107 - cdiff of this particle - faint c signal & interesting shape, ^{so} stack
- (4) 108 - stack!

moving to new area around #3

- 109 - 150×150 box near #3
 110 - 60×60 zoom on 3, focus on #3 edge $Z=405$, moved to 412
 111 - $\sim 12 \mu\text{m}$ wide scan of 2 particles on #3
 112 - cdiff on these 2, $\sim 9 \times 3 \mu\text{m}$ - both show some c signal
 113 - zoom on left particle, $\sim 1 \mu\text{m}$ (sea salt?)
- (5) 114 - stack on 113 $\sim 2 \times 2 \mu\text{m}$
 115 - image of small particle on 3 - looks like sea spray
 116 - 2×2 c-diff

(116) ~~stack on 115/116~~

(6) 180928000 - stack on 115/116

- ok 01 - line scan (point by point)
 02 - opened 109 and went in the $\oplus X$ direction of X $\sim 58 \times 58$
 03 - 5×13 zoom on 2 particles.
 04 - 2×2 zoom on lower particle
 05 - cdiff on particle
- (7) 06 - refocus on particle and stacked
 07 - opened 03 and zoomed on upper particle (2×2)
 08 - refocus on particle + cdiff

- (8) 09 - stack
 ok 10 - line scan
 11 - detector

Holder SWAP

PUMP to 15 in Hg, 3910 Torr
 Filled to ~ 5 in with He, 6410 Torr

All data forward may
 be bad because monochromator
 calibration shifted - Beamline
 c is ~ 267 instead of 285 eV

New Sample: K8

180928012: Detector Scan

13-23: OSA scans. It was off center

24: 2 mm x 2 survey to find window of K8

25: 2 mm x 2 survey. Found corner, but windows are much larger

26: 500 μ m x 500. Lower right. Missed?

27: Redid 25. Window moved? Still nothing

28: OSA scan. Aborted. PMT was off

29: Redo 27. Found window.

30: Focus scan

31: OSA

32: detector scan

33-94 OSA, Detector Focus/Scan.

95 overview of slide

96

97 survey at corner

98

99

100 Focus Scan

101 Repeat Survey at Corner - possibly 2 particles

102 zoom after crash

103

104 Repeat Survey at corner - possibly 3 particles

105

106

107 Aborted PMT off

108 Focus Scan

109 Focus Scan

110

111

112

113

114

115

116 Survey near edge

9/28/18

Course 375
Course 5802

Sample K8 (continued)

180928117 Repeat Scan

- 118
- 119
- 120
- 121
- 122
- 123
- 124
- 125
- 126
- 127

Calibrated Slits
 Checked "EP to Focus"
 OSA Focus Scan.

OSA Focus finally worked
 Shorted scan, reset interferometer
 Survey repeat
 Focus scan

128 Survey of Slide

129 OSA again after crash

130 100um survey near top edge

131 Zoom on particle

132 C-difference shows no particle @ 280-294eV ~10x2

- 133
- 134

① (mini-stack) linescan only

135 Line scan of double "particle" - Note - this turned out to be bad due to eV's being off

136 Zoom on big 30um particle ~30um.

137 C diff on big particle

②

138 Stack

139 Line scan of above - probably bad due to eV's being off
 (monochromator problem?) Artifact?

140 - green box near "particle" lower right but didn't show on scan

141 - zoom in - no particle

142 - New 200x200um scan near RH lower corner - see 1 particle

143 - zoom in on "particle" - nothing there 50x50

144 - upper right 200x200 including "particle" - see a few smaller particles - weird black at top

145 - scan of particle area seemed to shift off region of interest 200x200

146 - scan - registry off - moved from original area

147 - scan of same area - couldn't find "particles"

148 - zoom - smaller area - nothing

149 - 200 x 200 in middle of grid - shows some "particles", all same shape & size - artifacts?

150 zoom in on two "particles" to be sure - nothing except more artifacts
 move to next INP grid since nothing more to find

This holder @ 640 torr \approx 4 inHg on dial

17

SAMPLE M-8 - INP from ship 1/26/18

move z to 700, x 2500, y 6067 (holder position #3)

180 928 151 - Overview scan 2min, z=700

152 - 1000 x 1000 window scan z=500 - few particles

focus - looks great (z=500 to 482)

153 - 300 x 300 near upper left

~~154~~ zoom in 40 x 40 lower right - did not scan & would not

Abort - had to Exit program

154 - 200 x 200 μ m scan relative to 153 - most of particles gone
but a couple possibilities

155 - scan of lower right particle 30 x 30 - one faint particle left

156 - image of faint particle above

stacks 157 - Cdiff - no diff

mini ① 158 - line scan only - call "mini" stack

159 - zoom into another particle from 154, (upper) - no particle w/ scan

160 - new 300 x 300 area lower left of window

Accel Dist - increase for larger scans

161 - zoom in on 2 particles

162 - zoom in on left particle

163 - Cdiff left particle

164 - Cdiff left ~~particle~~ particle again

165 - stack aborted

mini ② 166 - line stack

167 - zoom on right particle

168 - Cdiff on right particle

③ 169 - stack on right particle

170

171

172

173 new particle

174 - Cdiff on that particle - doesn't look right - Matthew thinks

zone plate problem?

Next images are Matthew playing w/ zone plate, shutter, etc

Then OSA focus scan - OSA was out of focus - had to move zone

plate 100 μ m