

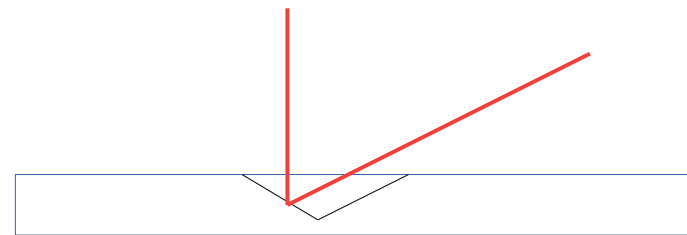
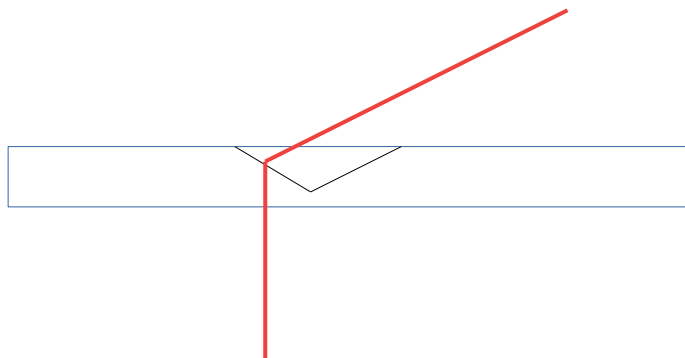


QM update

L.Millward@qmul.ac.uk

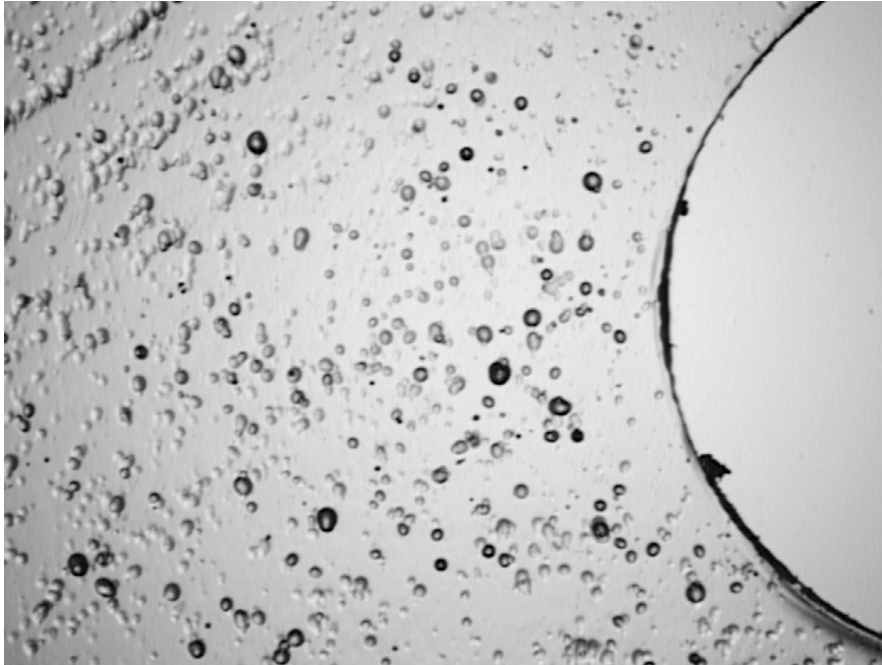
Scattering / Transmission

- Want to Find a Front Back asymmetry
- Dark Spots are caused when backlighting is scattered away from the lens.
- HYPOTHESIS: Halo lighting on front surface holes will cause additional illumination due to light scattering INTO the lens

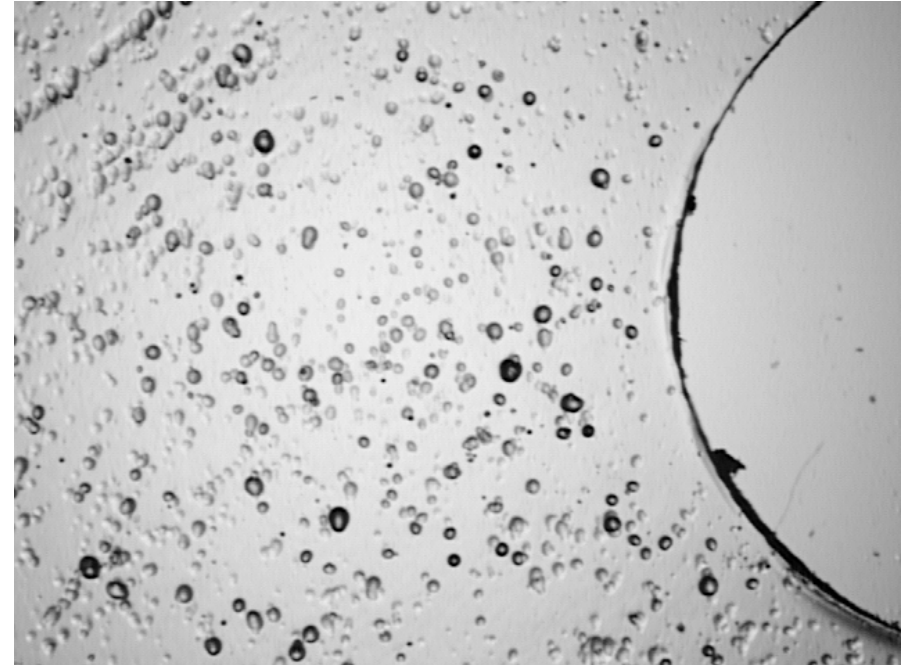


Front / Back comparison Study

Makrofol
'Correct Alignment' - (foil numbering up)
Backlighting

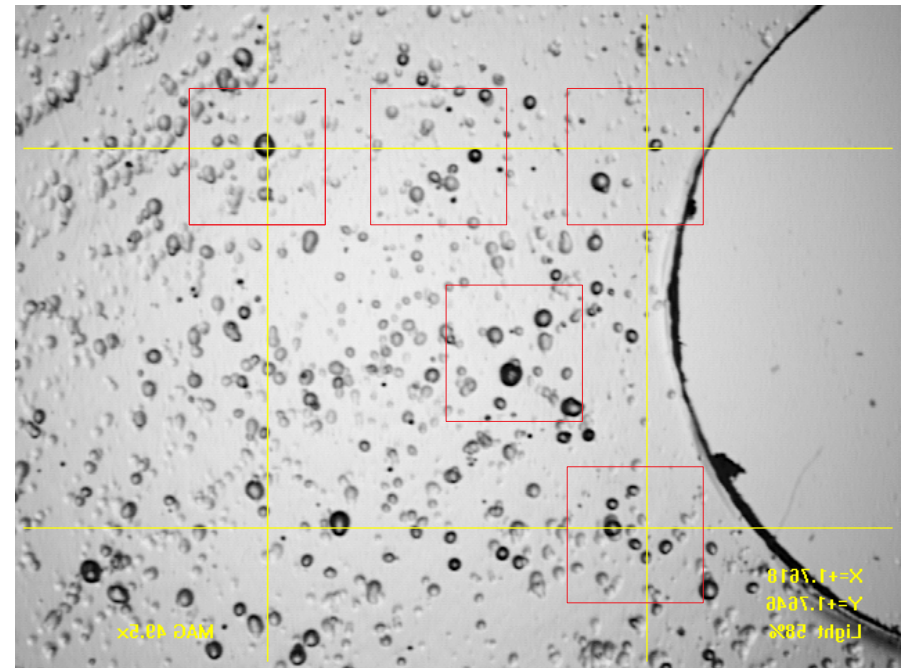
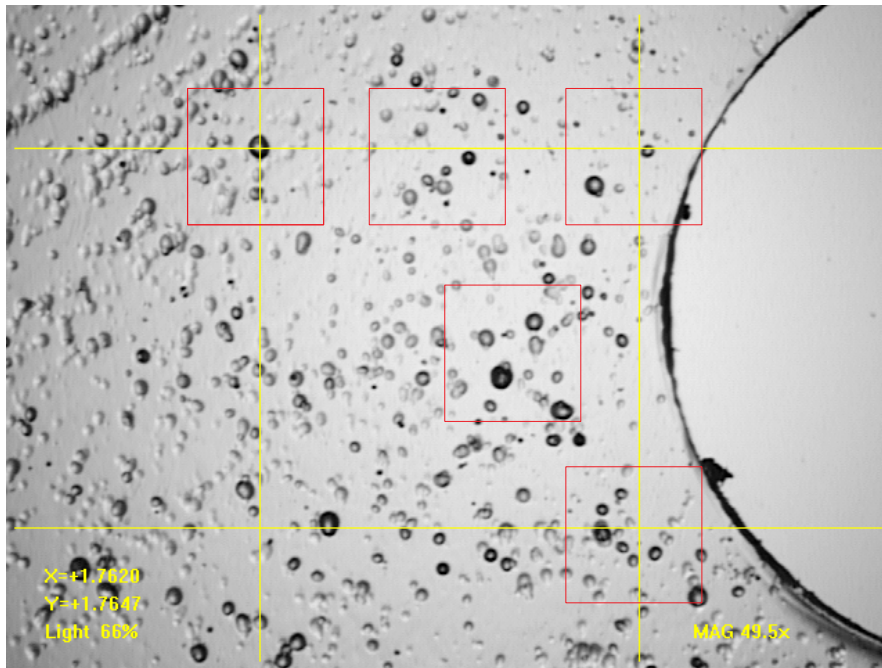


Makrofol
'Reverse-side-flipped'
Backlighting

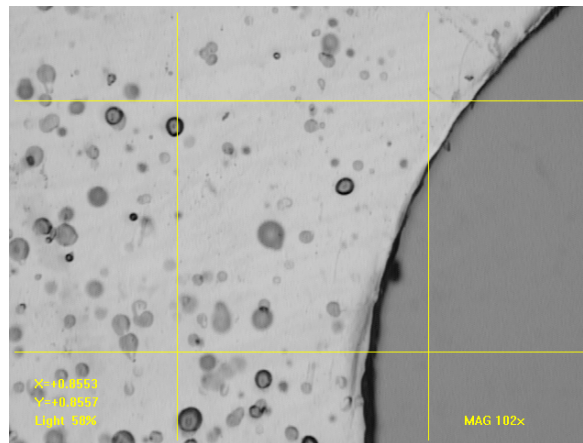
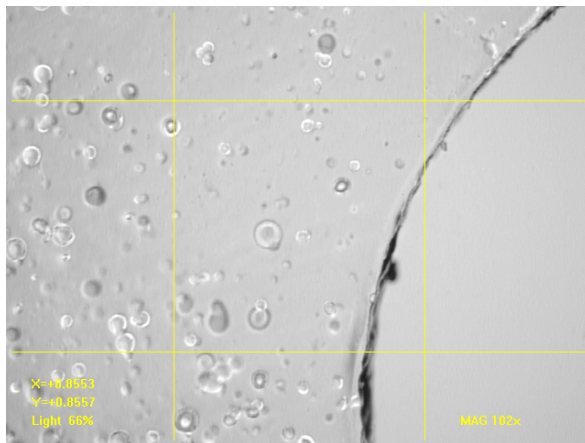
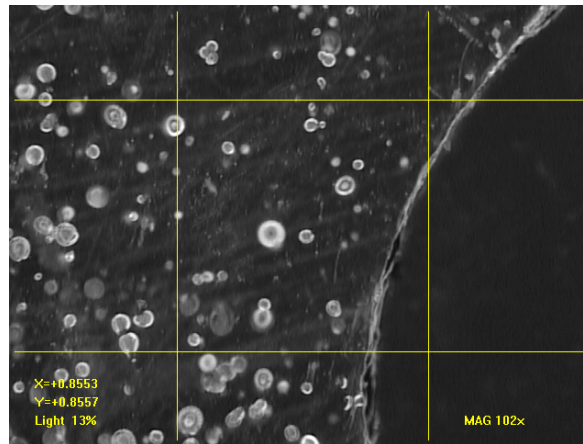
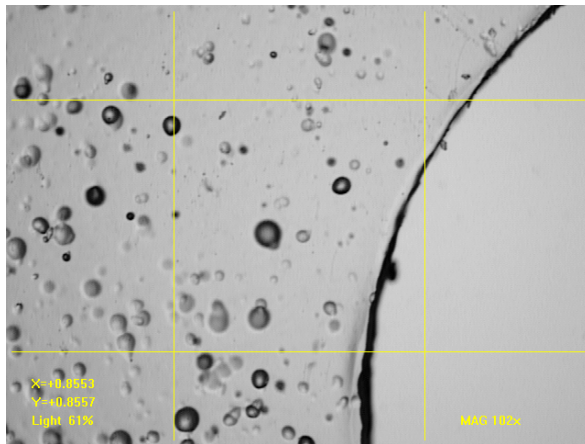


Front / Back comparison Study

Align Using Target and reference holes
Define regions of interest / closer study



Imaging Parameters

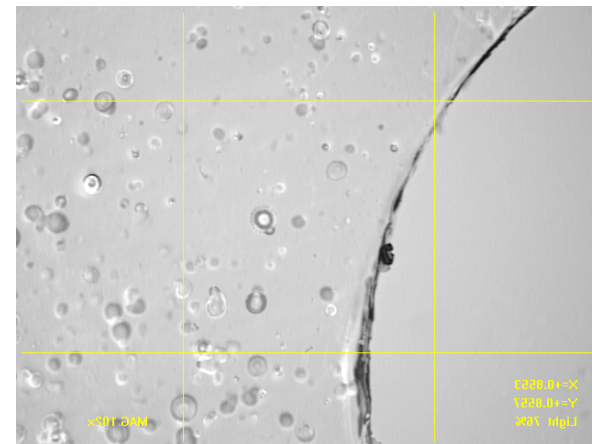
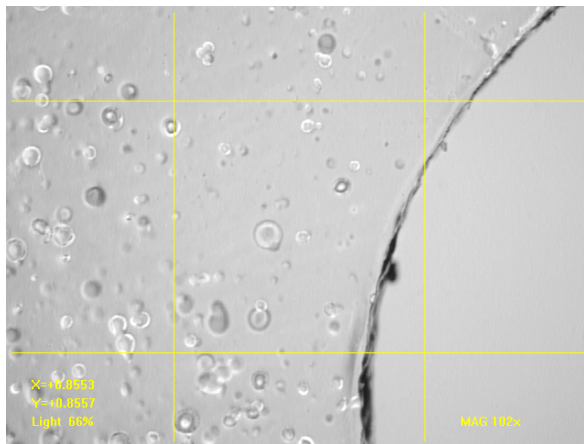
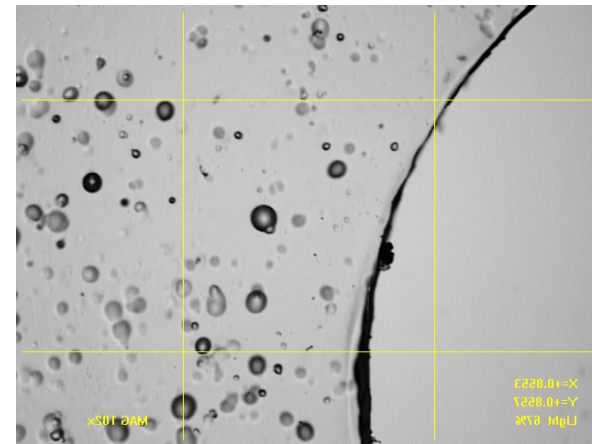
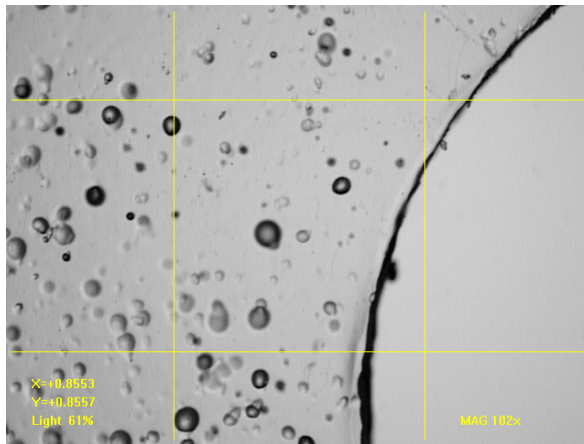


Backlighting = 60
Halo lighting = 150
Backlight + Halo
Lens Lighting = 15

Same approx light level
In all cases but halo

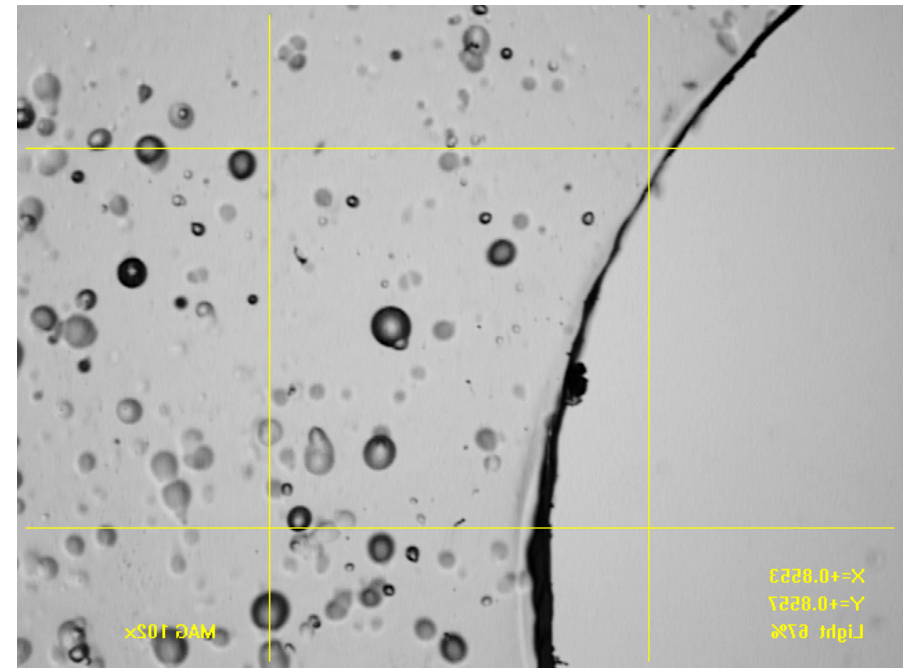
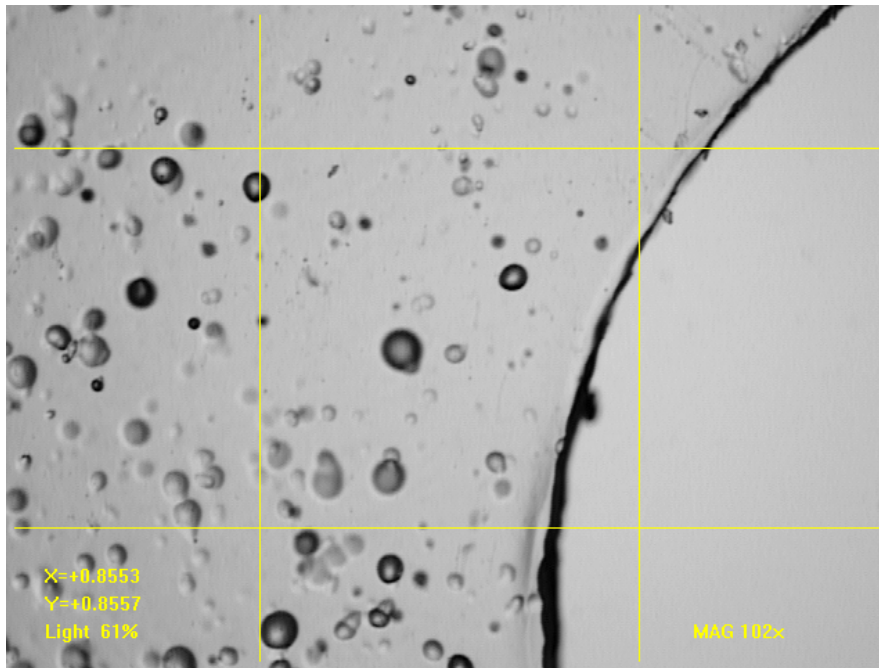
Zoom = 102x

Top Right Corner



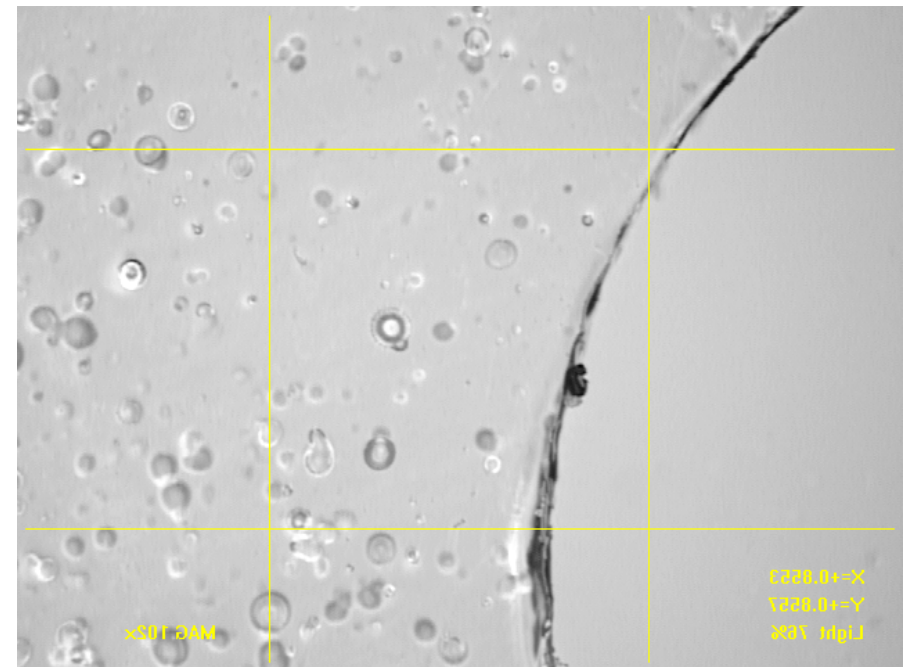
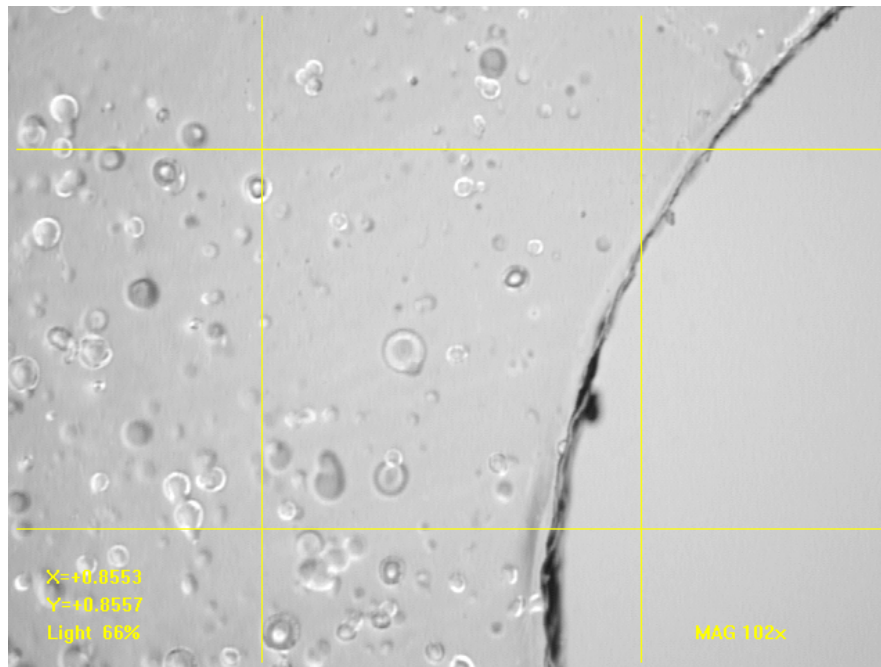
TRC - Backlighting

No clear difference
Relative symmetry between front and reverse.



TRC - BackLight + halo

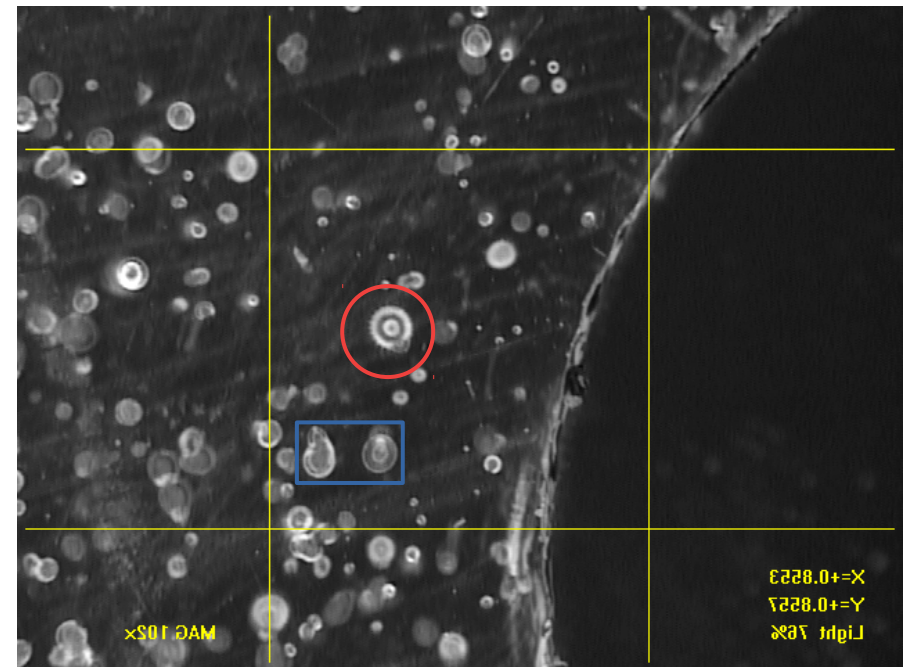
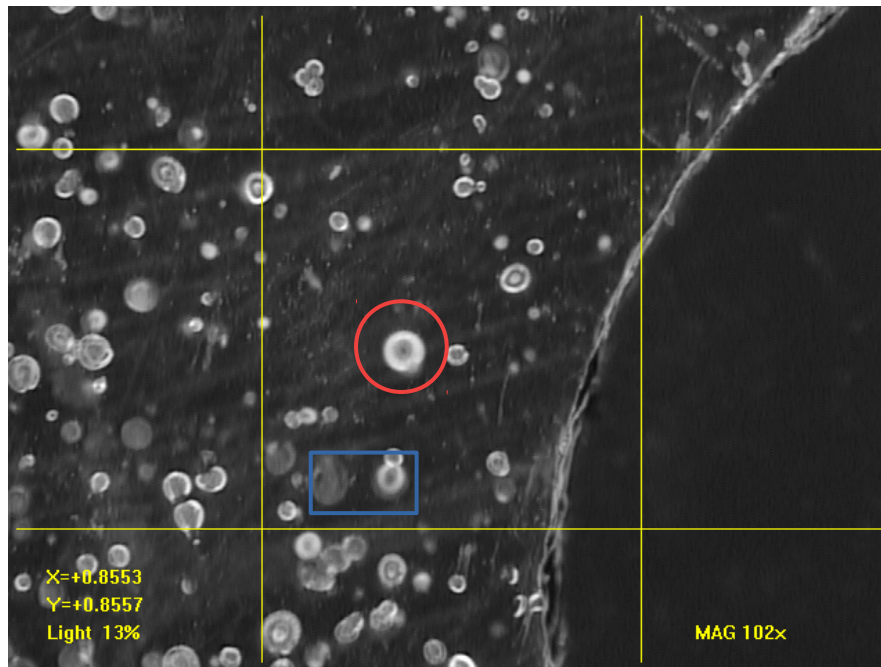
Bright spots in multiple holes,
Bright spots on front largely correspond to Dark spots on reverse, Vice Versa
Supports scattering and transmission hypothesis



TRC - Halo

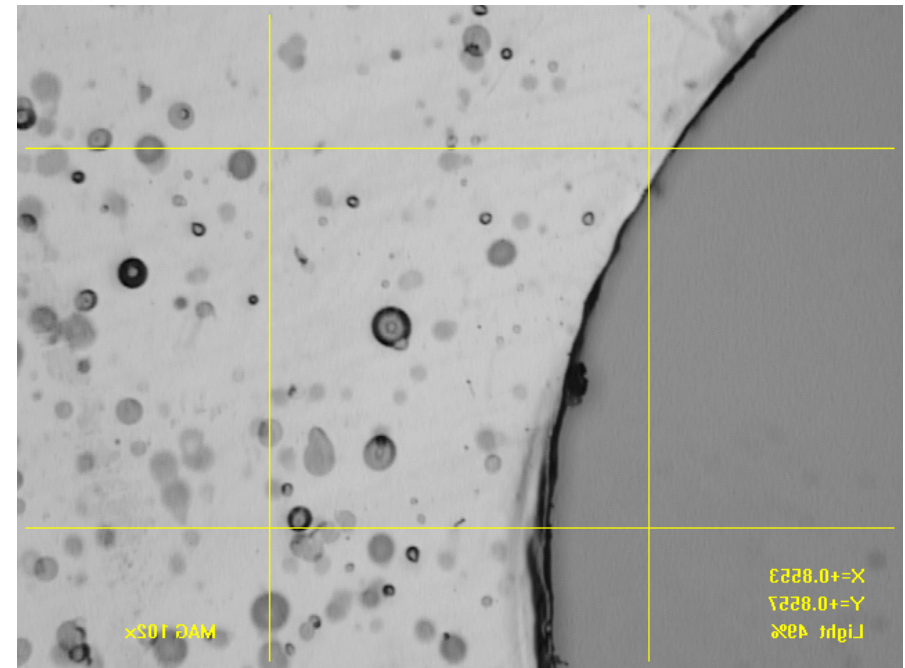
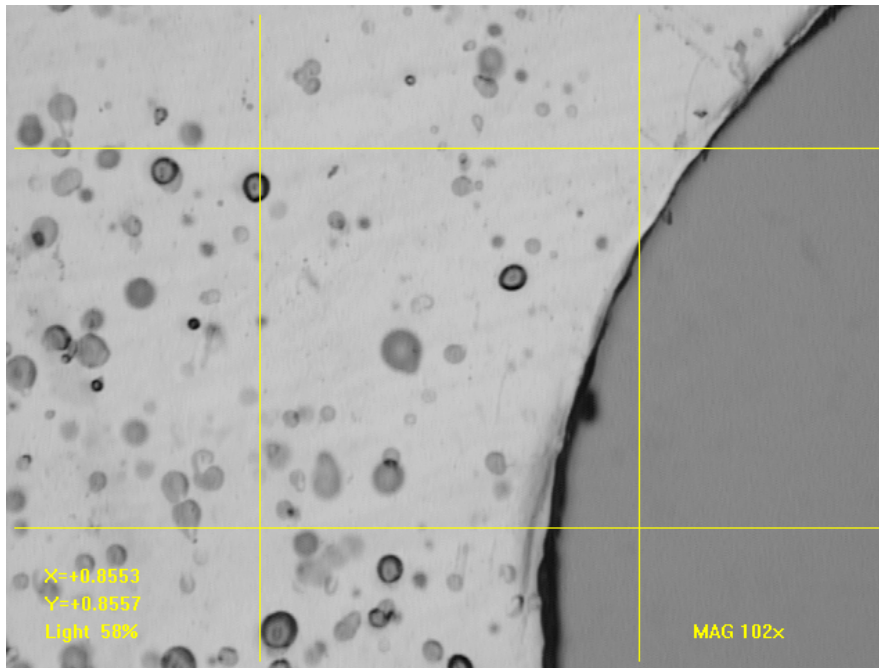
Red – Example of hole appearing Highlighted on both sides

Blue – Example of two holes, one highlighted on one side only

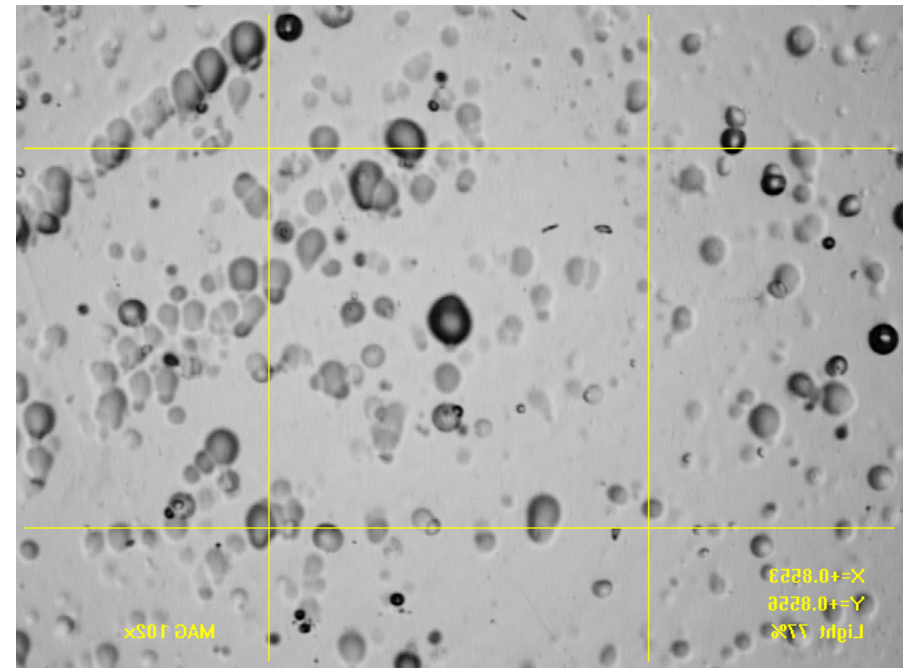
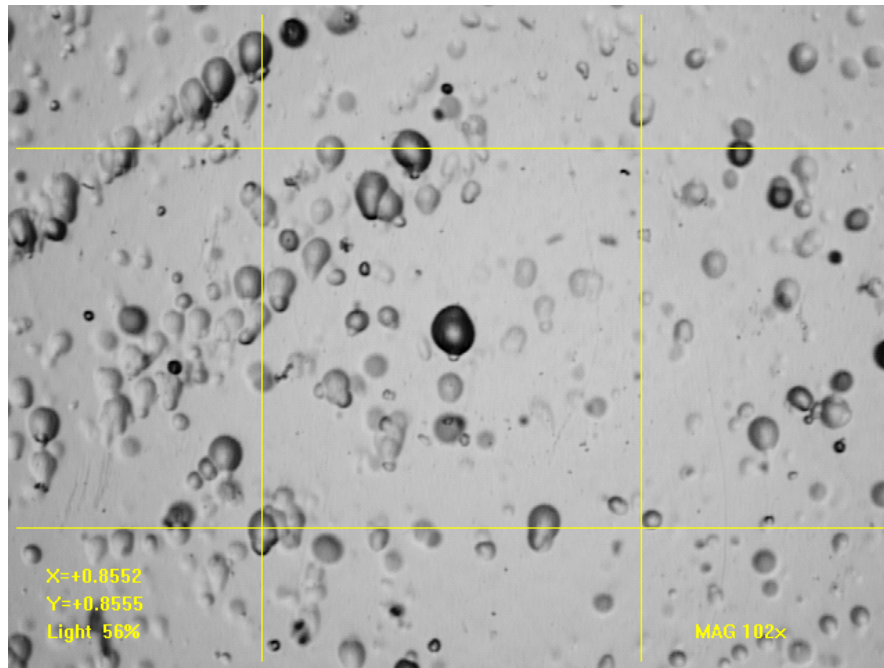


TRC - Through Lens

Brightness variation quite sensitive to focal plane
Brightly Illuminated pits under halo lighting, correspond to dark spots here.



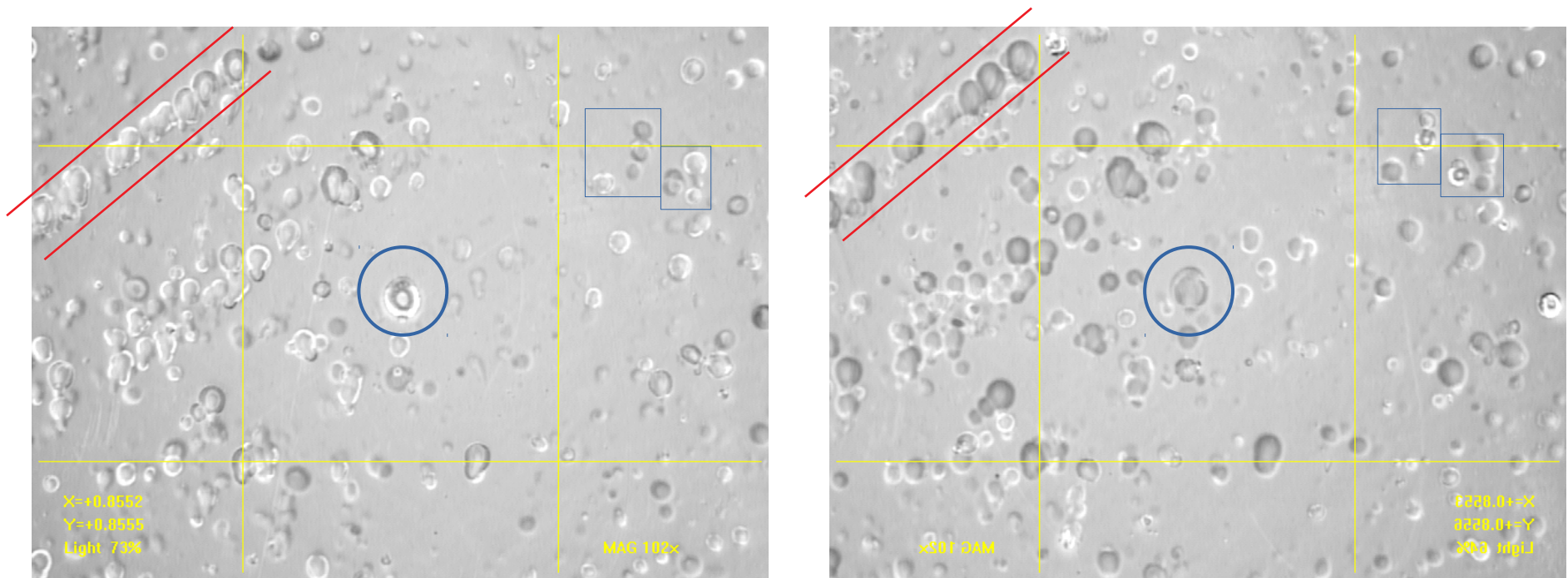
Top Left Corner



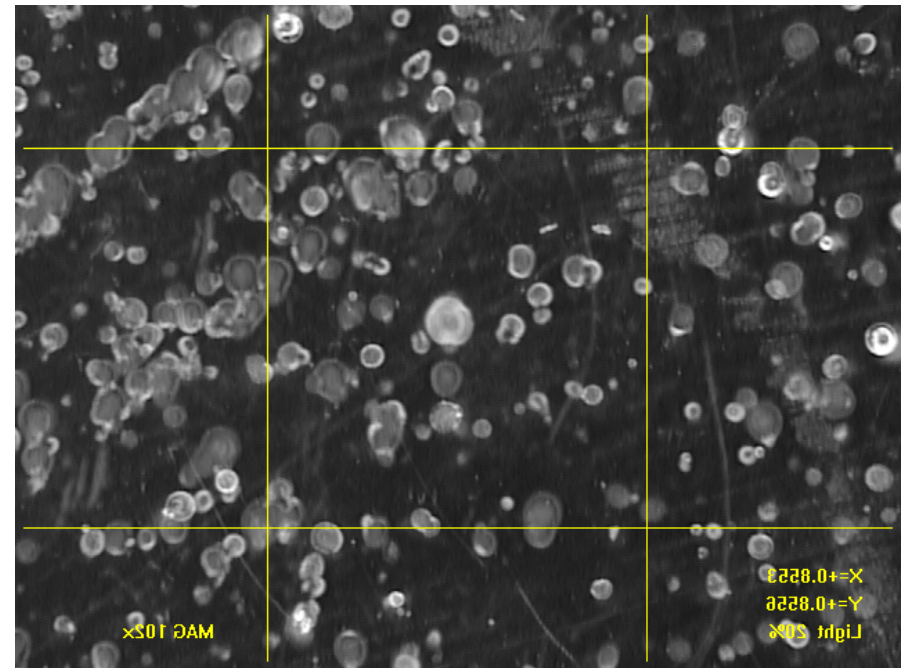
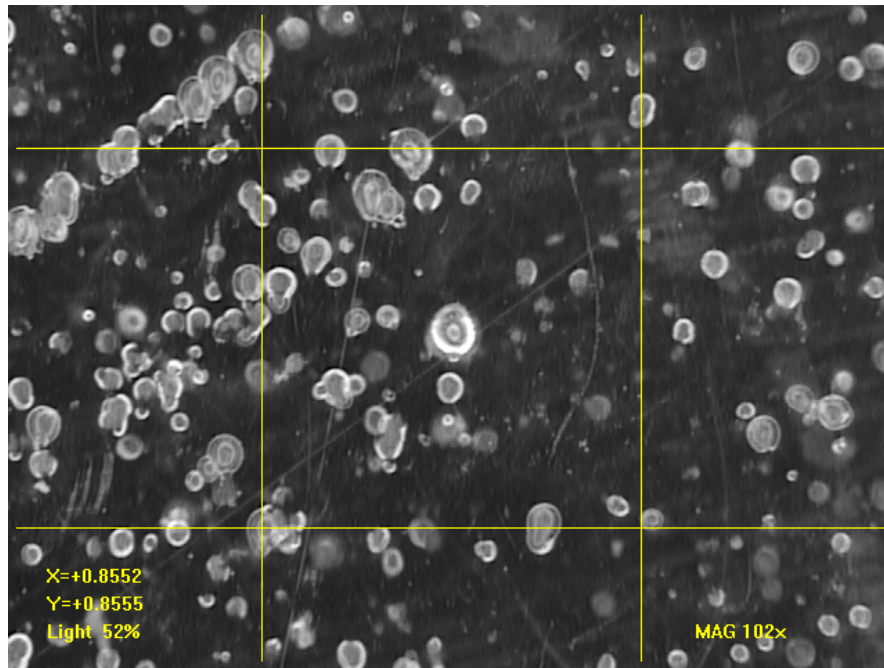
Top Left Corner - B+H

Line – probably a scratch or common event, thus expect holes to appear on the same side.

Side reversal flips bright / dark features, supporting hypothesis

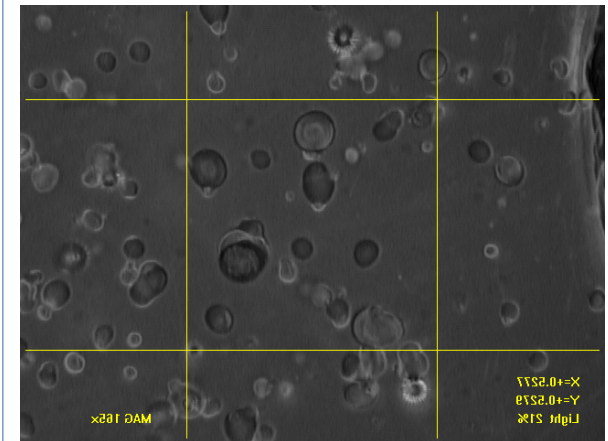
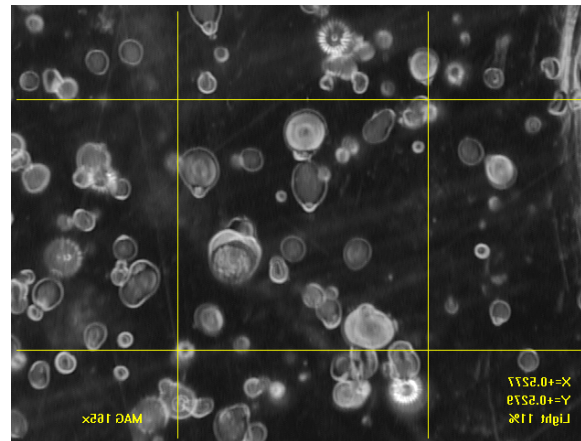
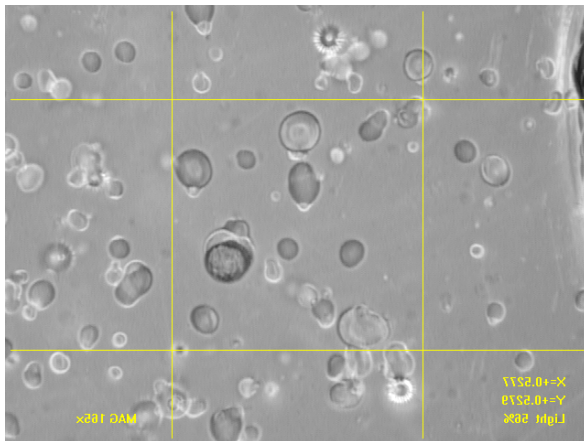
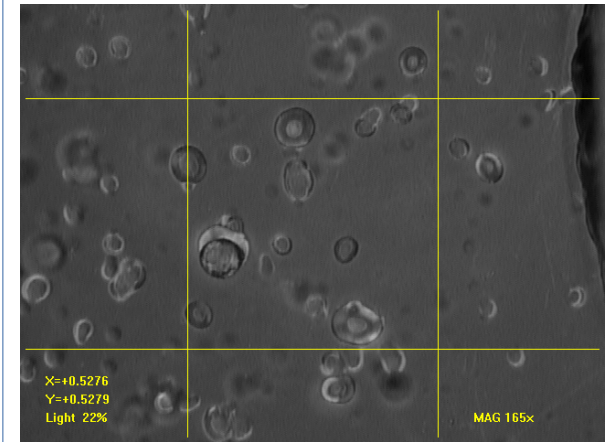
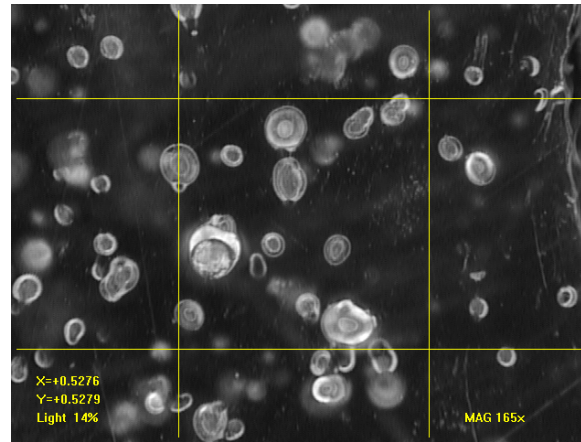
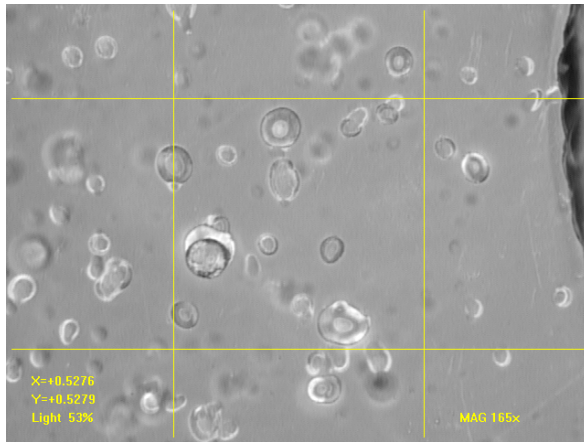


Top Left Corner



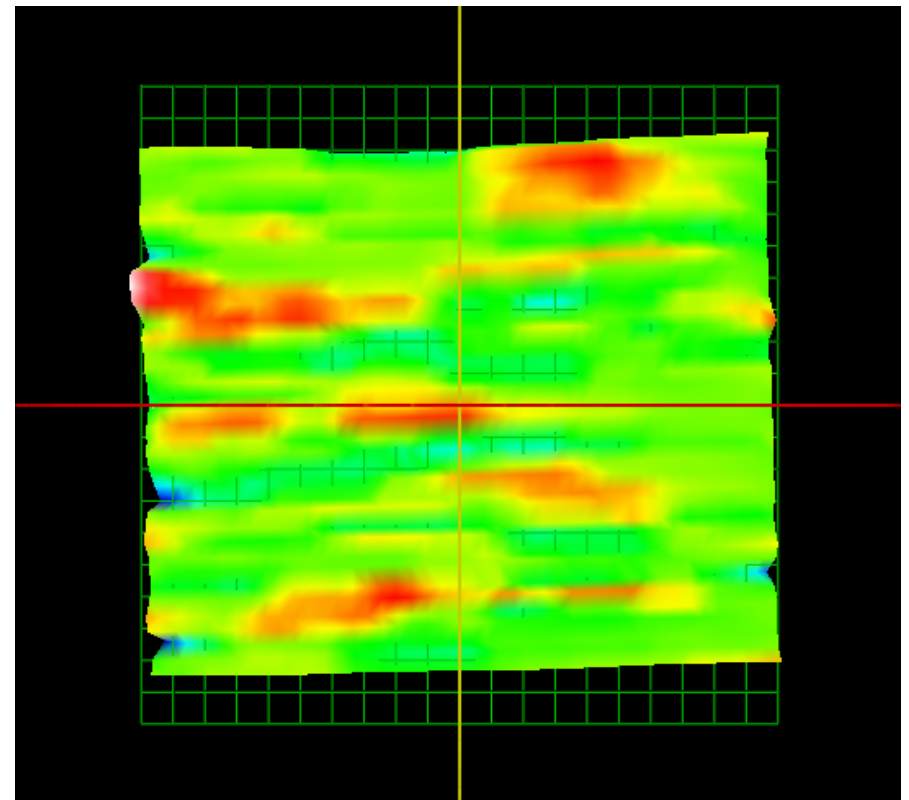
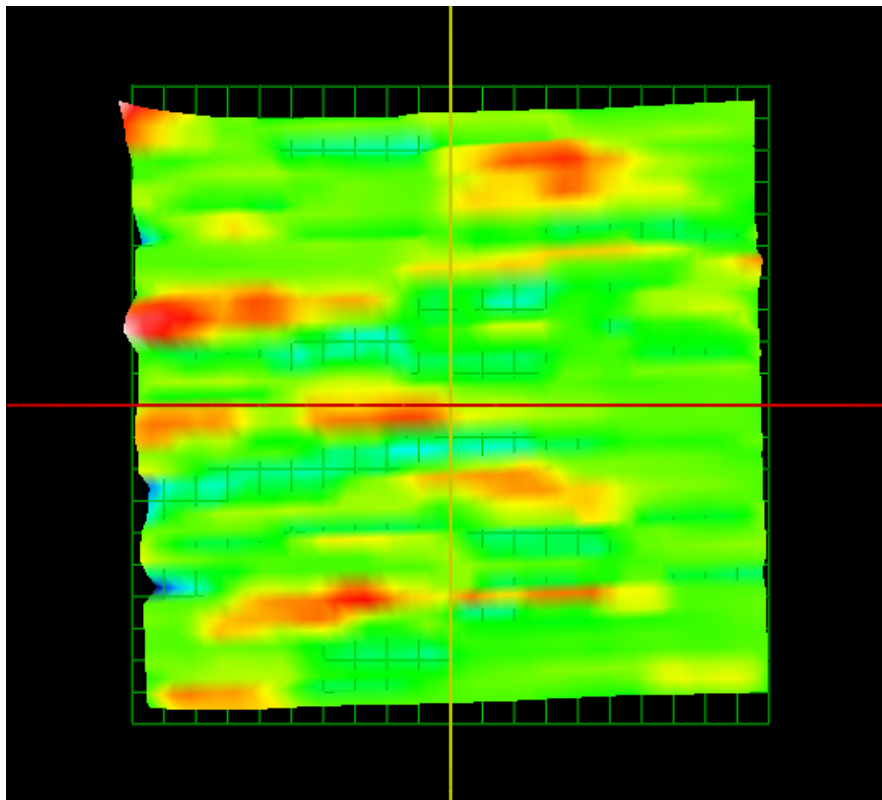
Triad region, 165x Zoom

BI = 8, HI = 100



Laser resolution

RHS, laser position resolution x 10, not a major improvement
Tracking path (x,y) shows it does not travel completely smoothly





Next steps;

- More work on Automation / routines
- Fine-tune and understand laser more
- Look at different halo / backlighting mixes
- Collect some bulk data, try to train rudimentary pit-finder