Sasha Bakker

Final Plots

Sample	Speed (cm/s)	Avg. Length (cm)	Stdev. Length (cm)
A01_03_G2	0.05103916	1.494	0.004
A01_04_G2	0.04897462	1.494	0.004
A01_05_G2	0.04662186	1.494	0.004
A02_02_G3	0.05776910	1.279	0.006
A02_03_G3	0.05324115	1.279	0.006
A03_01_G3	0.05226456	1.123	0.003
A03_02_G3	0.05419758	1.123	0.003
A04_01_G3	0.06187608	0.94	0.01
A04_02_G3	0.06427387	0.94	0.01
A04_03_G4	0.06124668	0.94	0.01
A04_05_G4	0.06686494	0.94	0.01
A04_06_G4	0.05838662	0.94	0.01

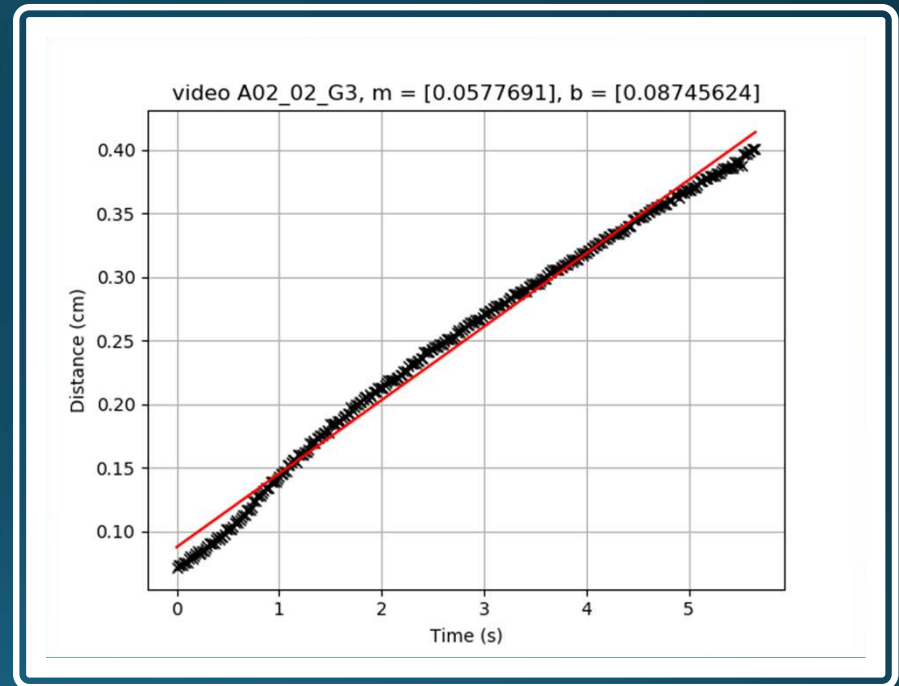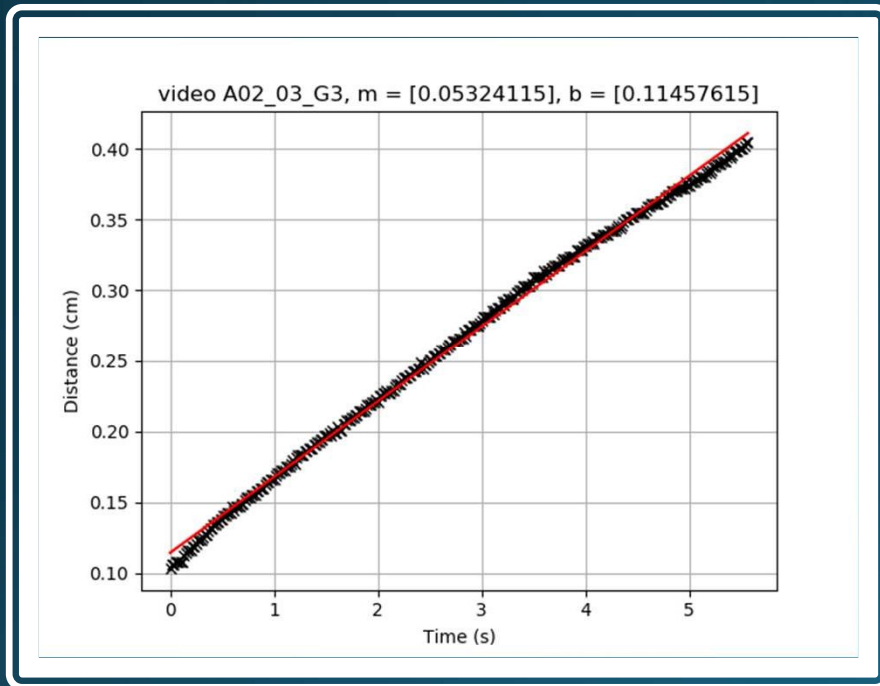| Sample	Speed (cm/s)	Avg. Length (cm)	Stdev. Length (cm)
A00_01_G0	0.04346613	2.39	0.02
A00_02_G0	0.04378507	2.39	0.02
A00_03_G0	0.05678084	2.39	0.02

Details

- Used sample "A"

- Cut it down, resulting in four samples: A01, A02, A03, A04

- With lengths ~ 1.5, 1.3, 1.1, 0.9 cm and keeping the length the same ~ 0.7 cm width

- The G2, G3, G4 indicates whether the sample data shared the same glycerol.

- For A01: 3 videos with G2
- For A02: 2 videos with G3
- For A03: 2 videos with G3
- For A04: 2 videos with G3, 3 videos with G4

- The green data is the previous data for sample A – calling it A00 at length ~ 2.4 cm
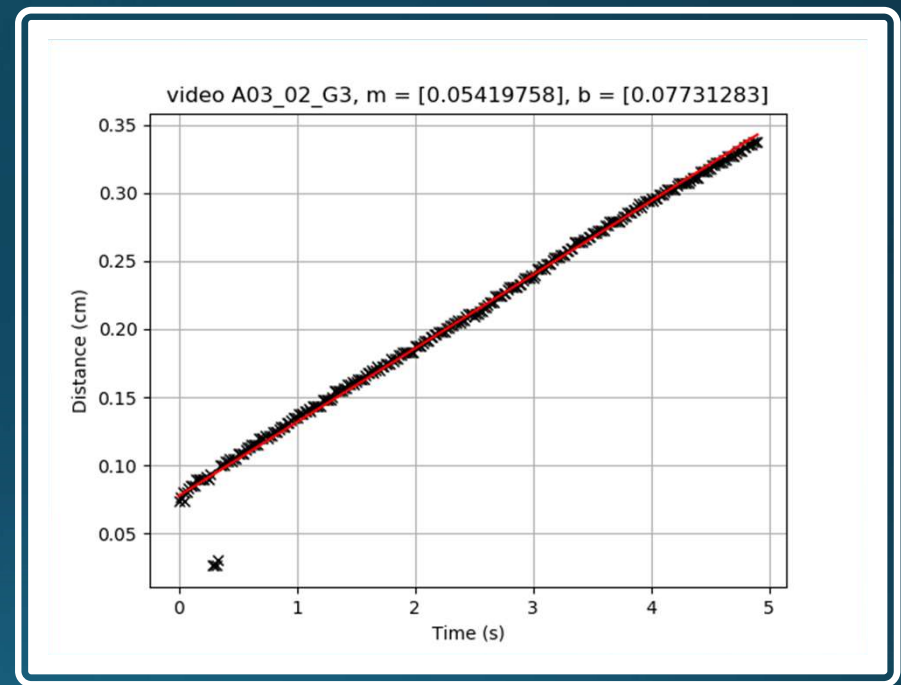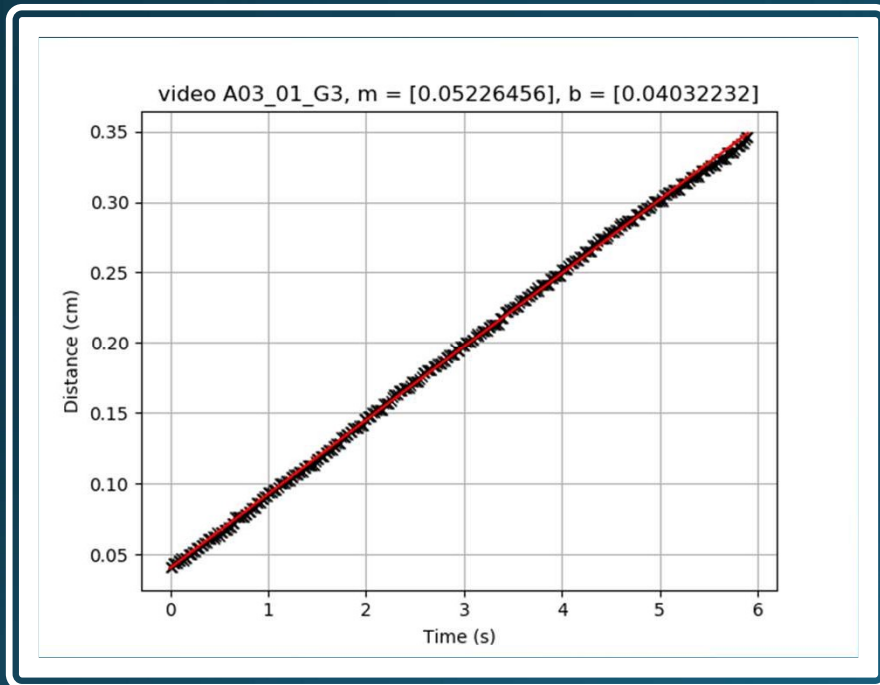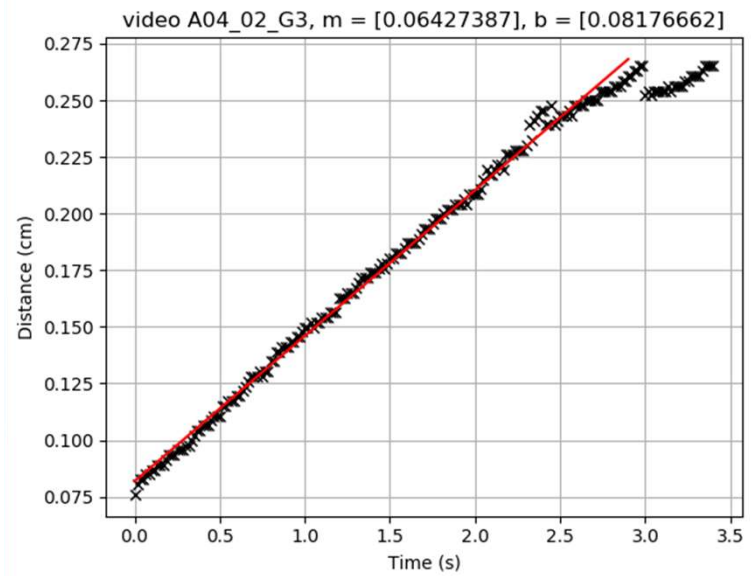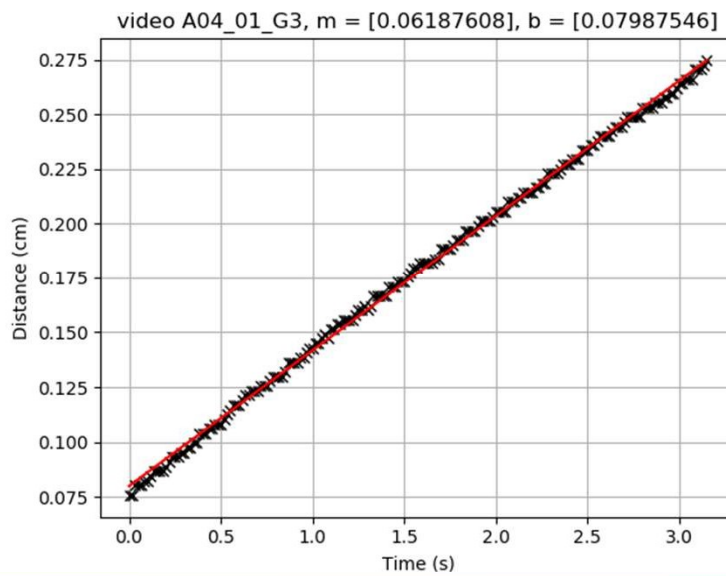
Sample A01

Sample A02

Sample A03

video A03_01_G3, m = [0.05226456], b = [0.04032232]

video A03_02_G3, m = [0.05419758], b = [0.07731283]

Sample A04

video A04_01_G3, m = [0.06187608], b = [0.07987546]

video A04_02_G3, m = [0.06427387], b = [0.08176662]
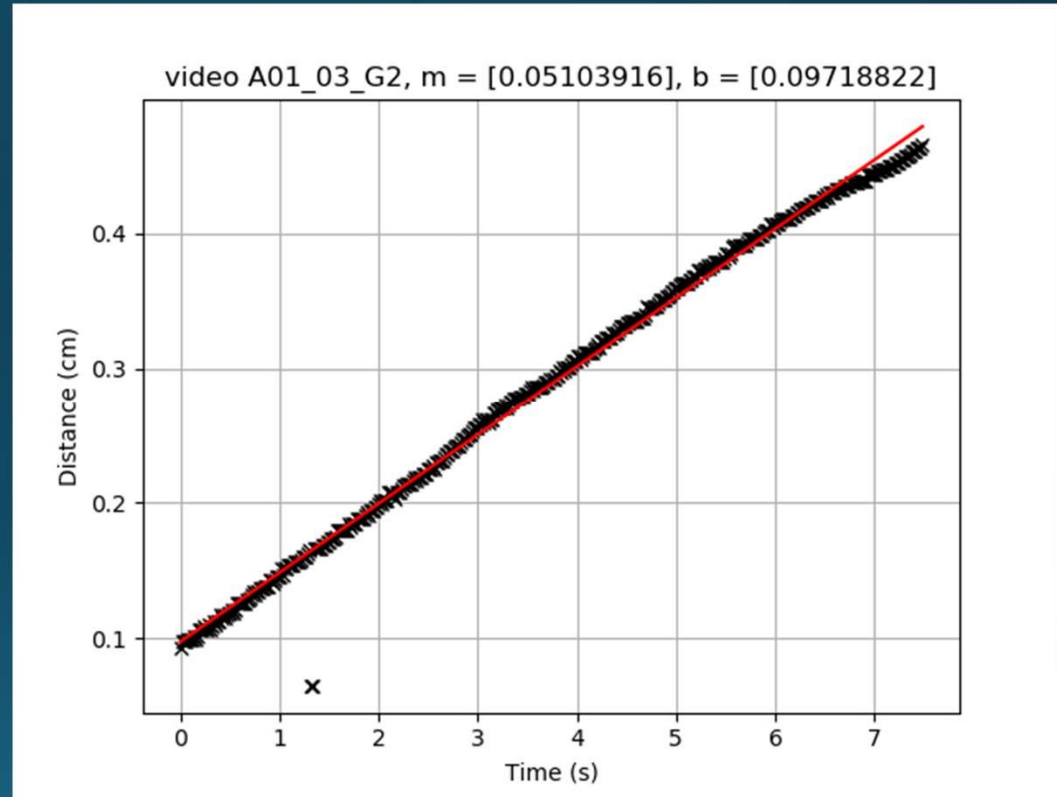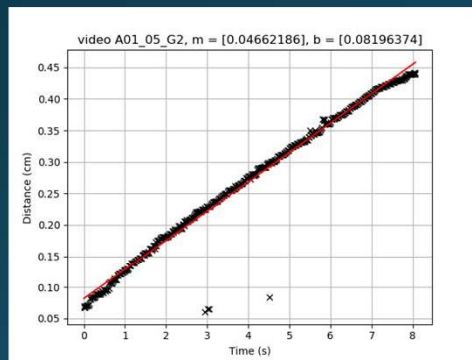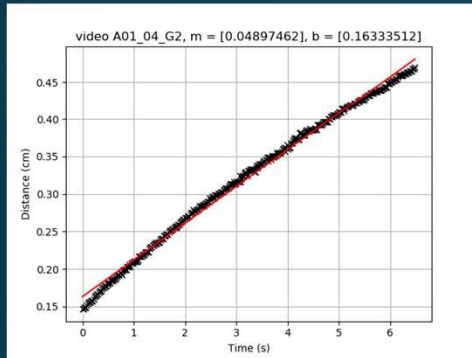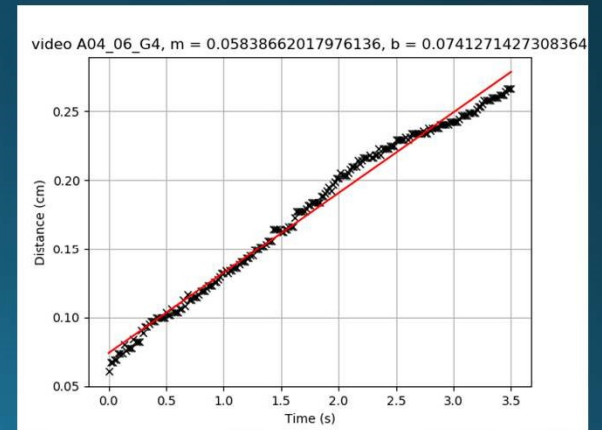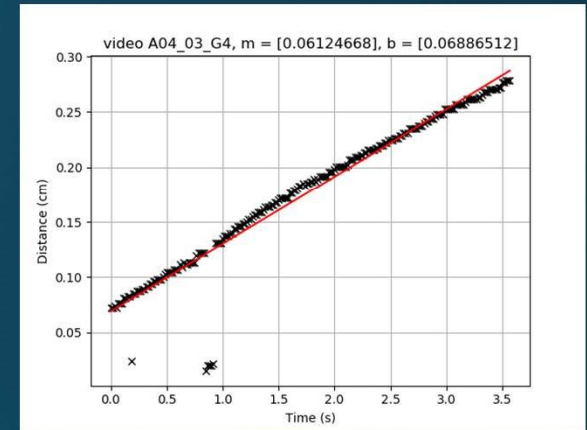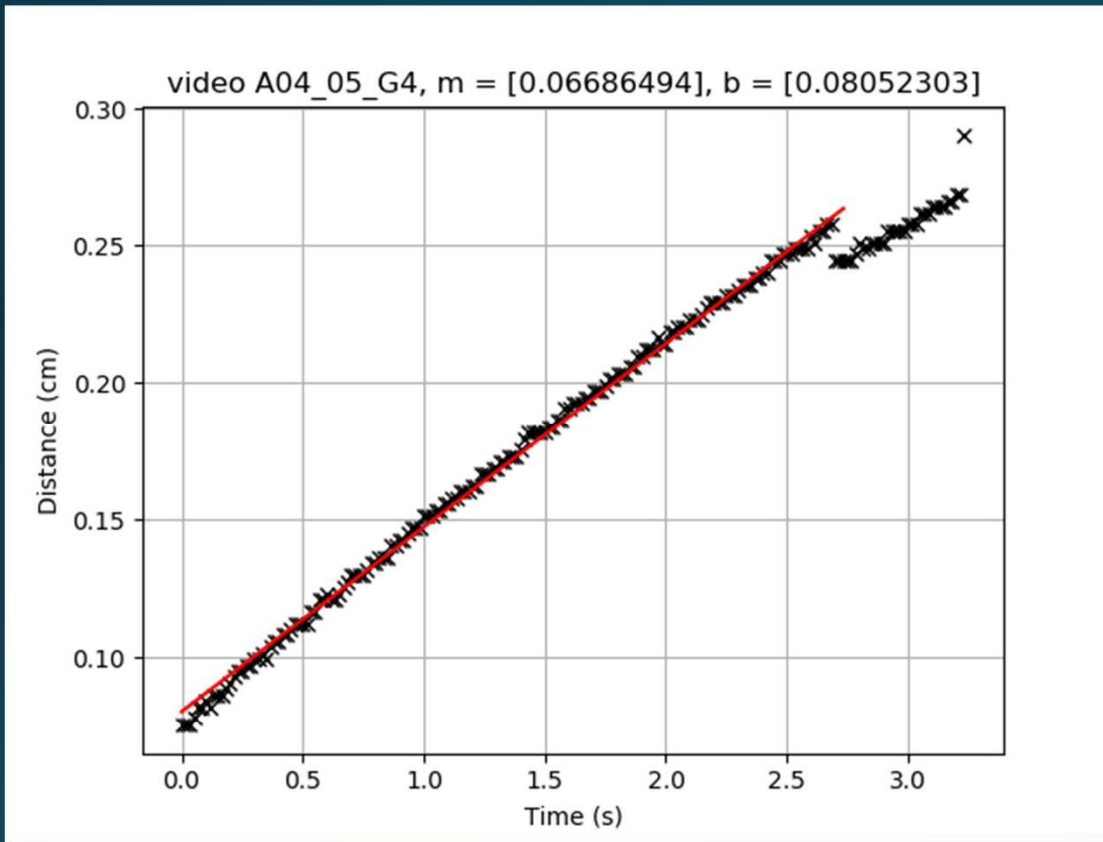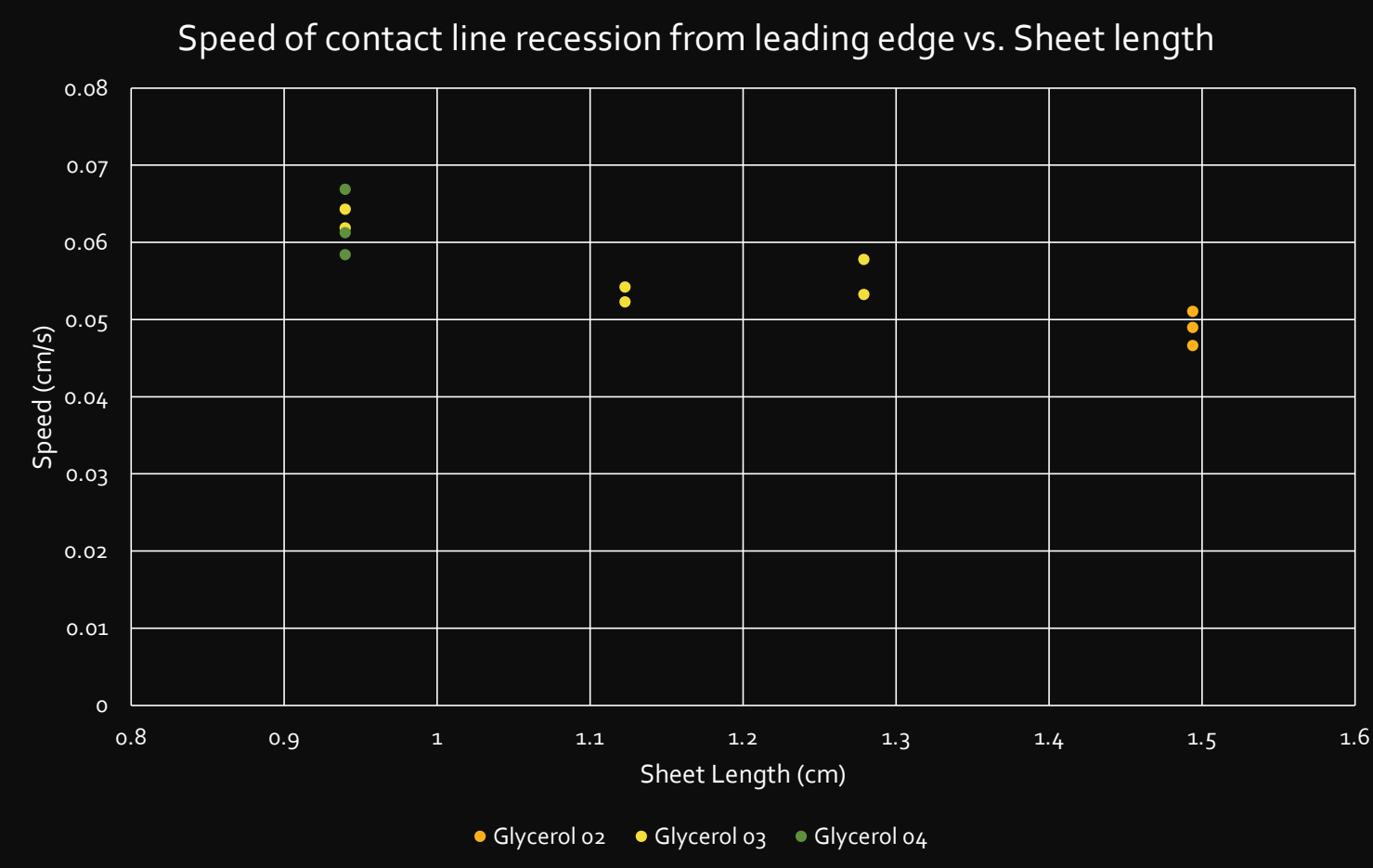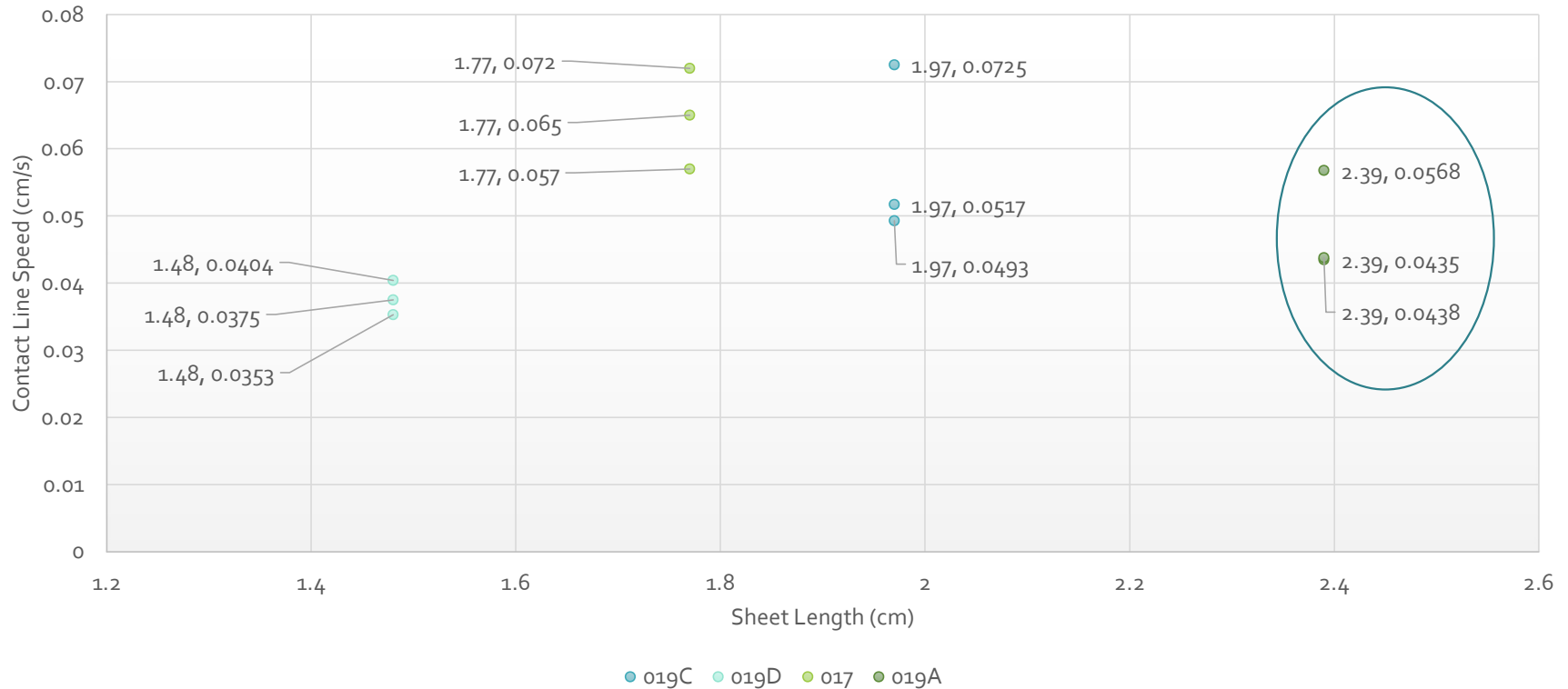
Sample A04

Avg. Width: 0.074
Stdev. Width: 0.005

For a sheet length of approx. 0.9 cm (Sample A04) we see that the change in glycerol from yellow to green did not show any obvious effect on the reported speed of contact line.

All the data was taken in the same day and under the same lighting conditions. Just looking at this it may seem like the longer sheet may have a slower speed... but no conclusion can be made without looking at the full picture. AKA including previous data point for sample A00.

Speed of contact line recession from leading edge vs. Sheet length
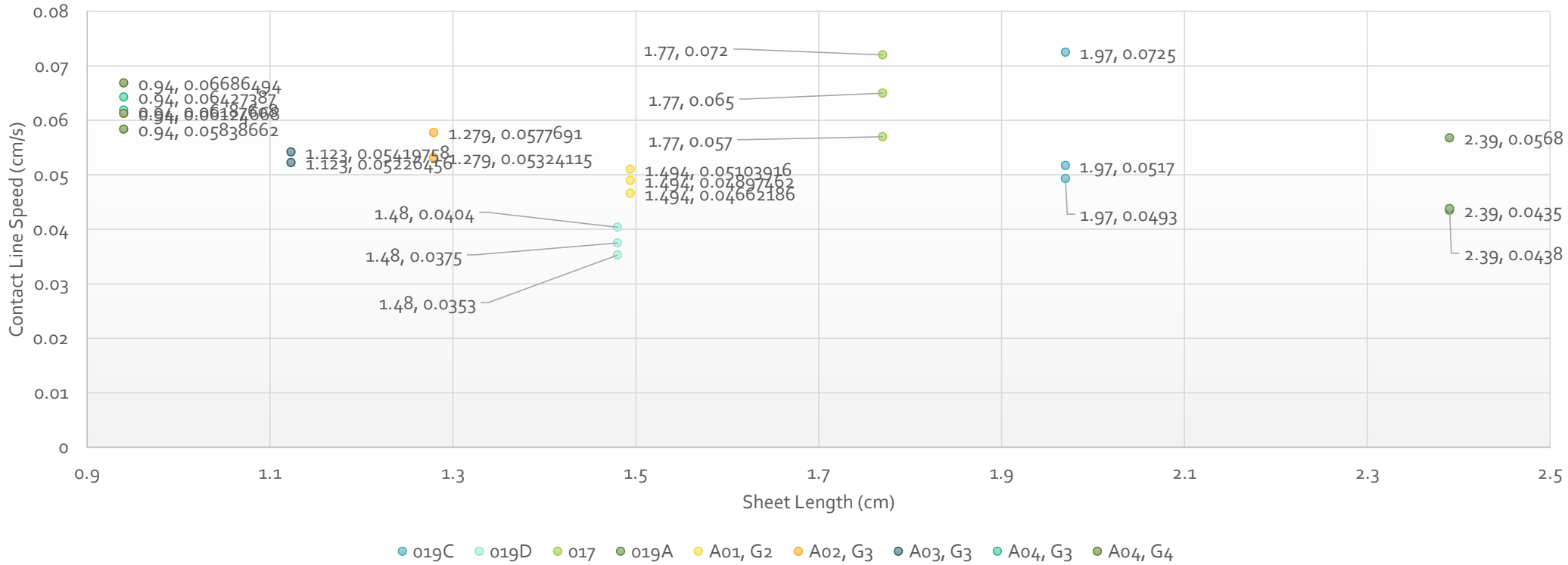
Sheet Length vs. Contact Line Speed

Sample A: 0.74 cm width; Sample B: 0.71 cm width; Sample C: 0.69 cm width; Sample D: 0.71 cm width

All these samples were individually cut from the same sheet (so they should have the same density property)

This does not show any linear relationship

Sheet Length vs. Contact Line Speed

Putting it all together it doesn't seem like there is any linear relationship while changing the sheet length but having only approximately the same width +/- 0.05 cm. There may be other physical differences between these sheets ex. Holes, dents/scratches, rough vs. smooth edges, or dust particles on the sheet

Would require further testing by cutting down one sheet to account for these other properties and to really show whether the relationship with sheet length and contact line speed is actually linear for the same properties and same sheet width.

video A_01, m = [0.04346613], b = [0.11771994]

video A_02, m = [0.04378507], b = [0.10662448]

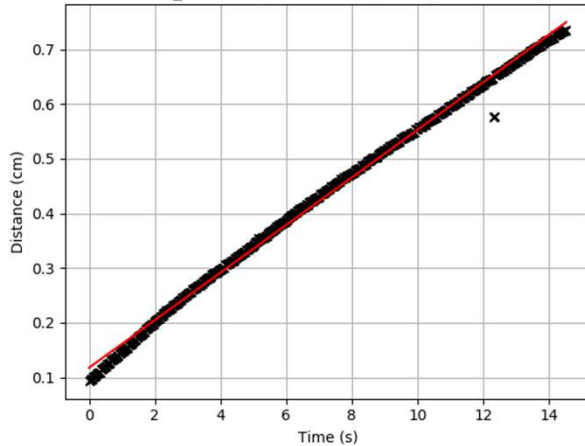video A_03, m = 0.056780838469901944, b = 0.09089420425271703

Sample 019A
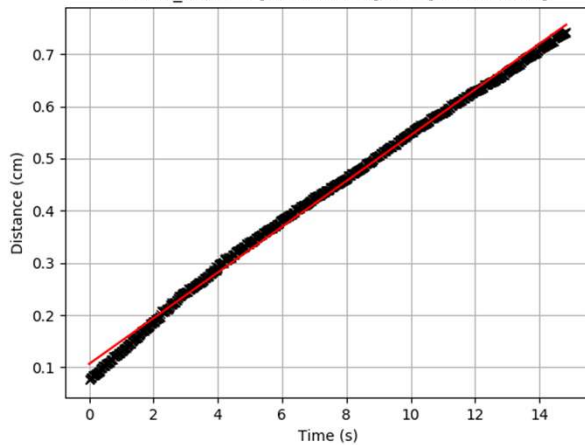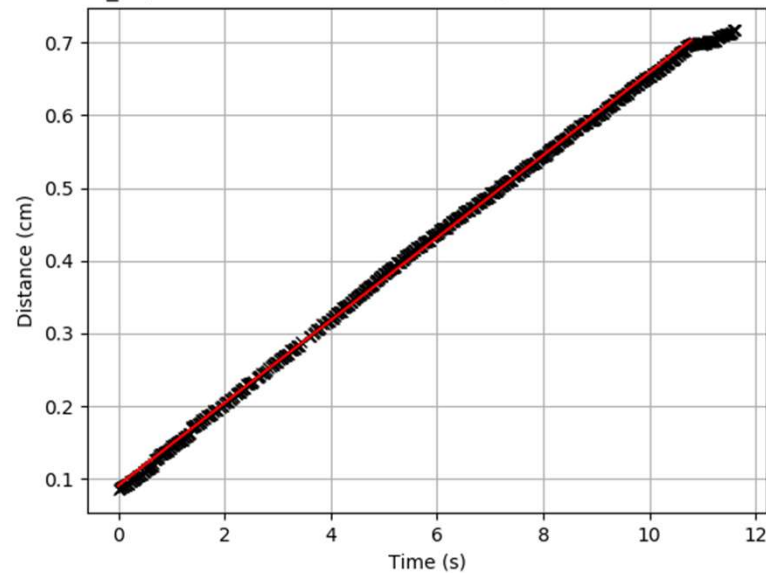
Sheet Dimensions (L X W)

= 2.39 X 0.74 cm

Looking at the previous A data – A00 – we see that the difference in leading edge vs. time has a linear relationship without any strange artifacts to alter the slope of the data. The third video does indeed have a greater slope than the first and second videos. Comparing 0.057 cm/s vs approx. 0.44 cm/s (a 0.13 approx. difference in slope which is significant uncertainty).

Top View Videos

Let's look at how these videos look visually to see whether there is anything to account for this difference in slope

The videos look almost identical except the third video (the one which had the steepest slope) is much darker. This would affect the intensities of the plots and although the tracking is consistent for the leading edge / contact line but may not be tracking precisely what we want it do due to the differing intensity profile. There could also be other unforeseen underlying factors.
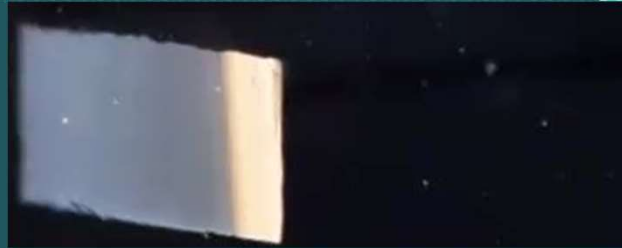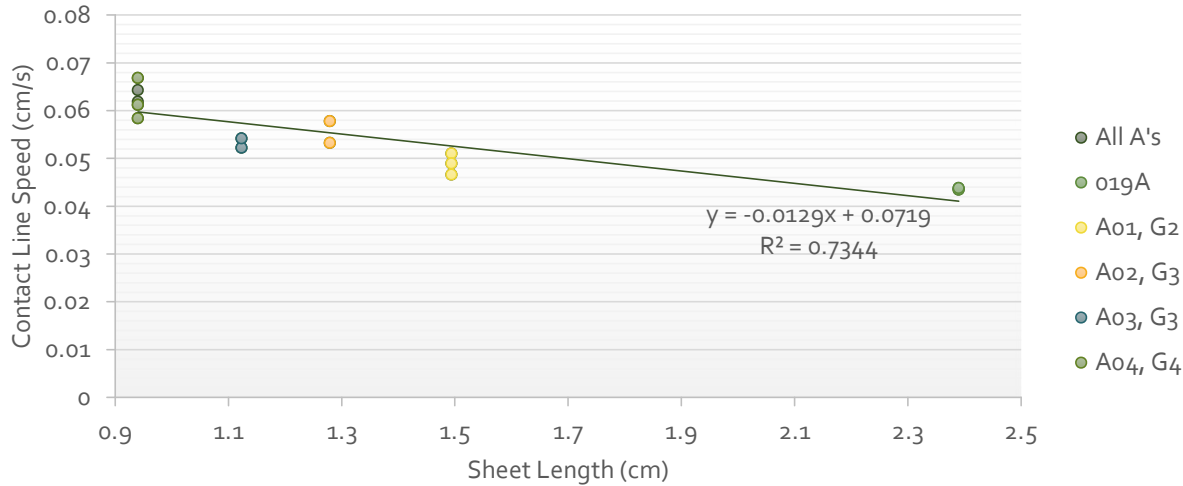

019A Samples 01, 02, 03
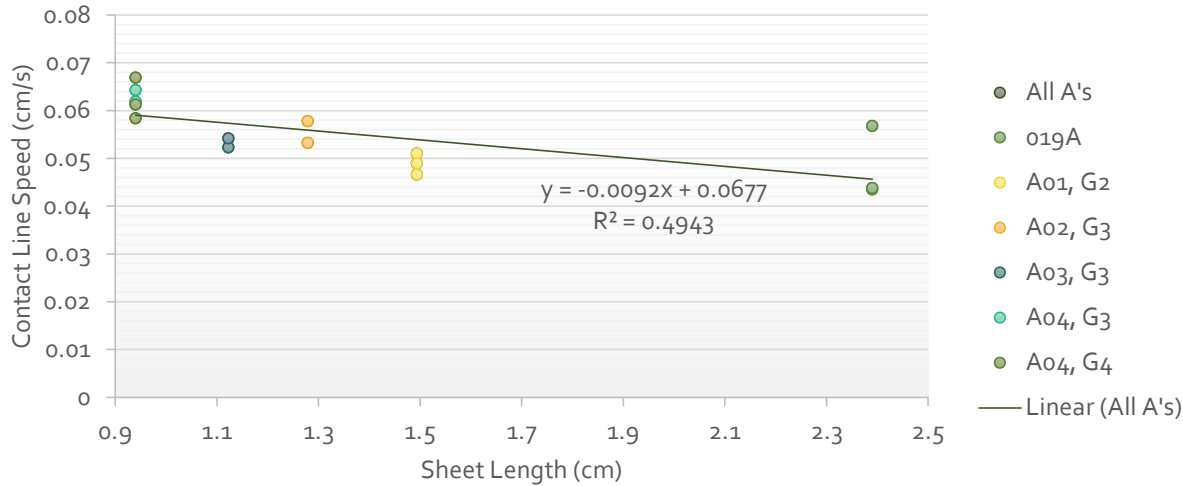
Slopes are similar --- approx. a change in speed of -0.01 cm/s for every cm of length added

This relationship is possible for sheets with the same properties however further testing would be necessary to suggest a general relationship for all samples of the pink sheet at the same density regardless of their other individual sheet properties. Meaning, we cannot say that this relationship is true for the other previously tested samples B, C, D when cut down to different lengths