

Exceptional service in the national interest



Avian Retina Oil Droplets

3-26-2014 & 3-27-2014

Sample preparation: Matt Toomey

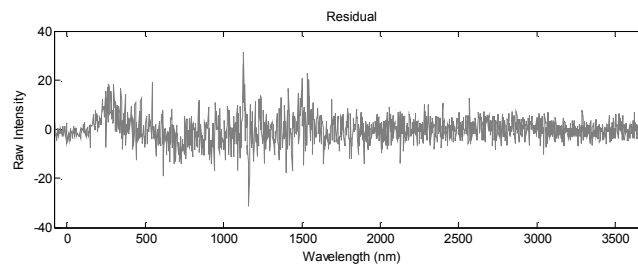
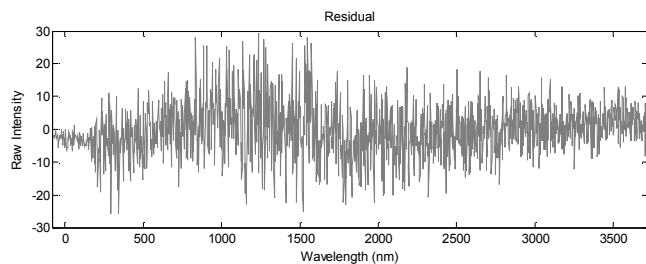
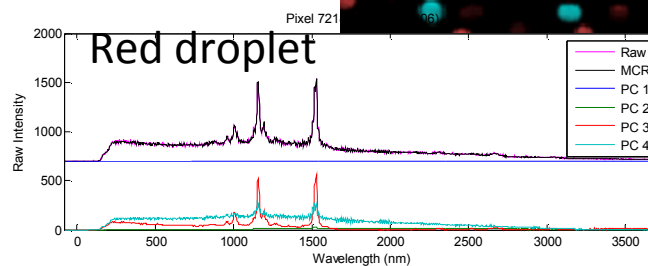
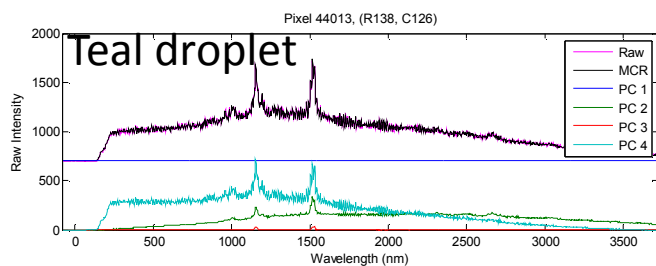
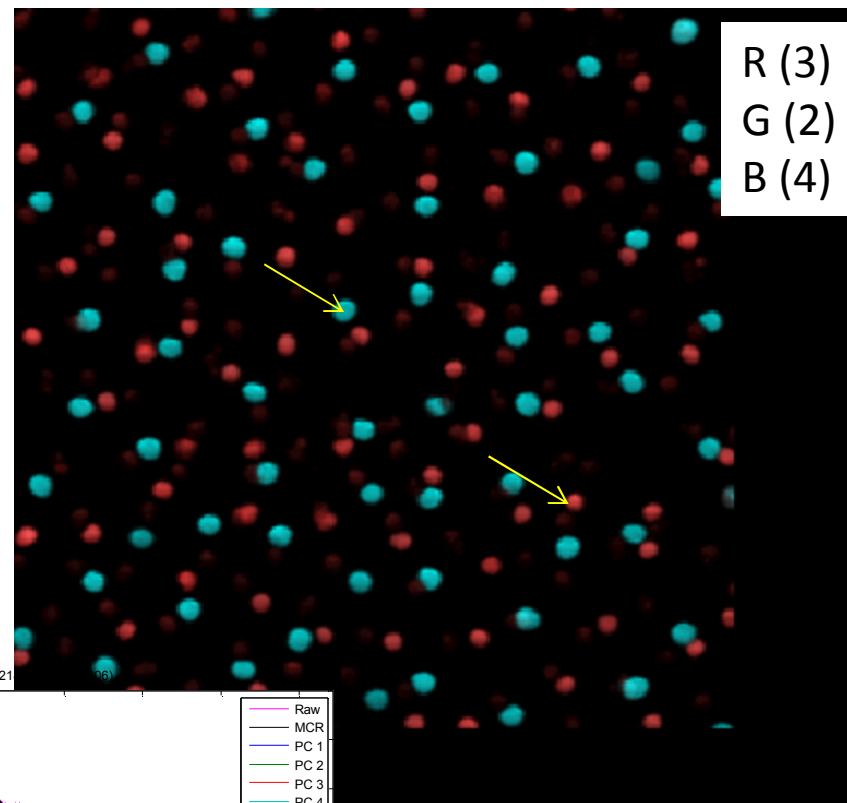
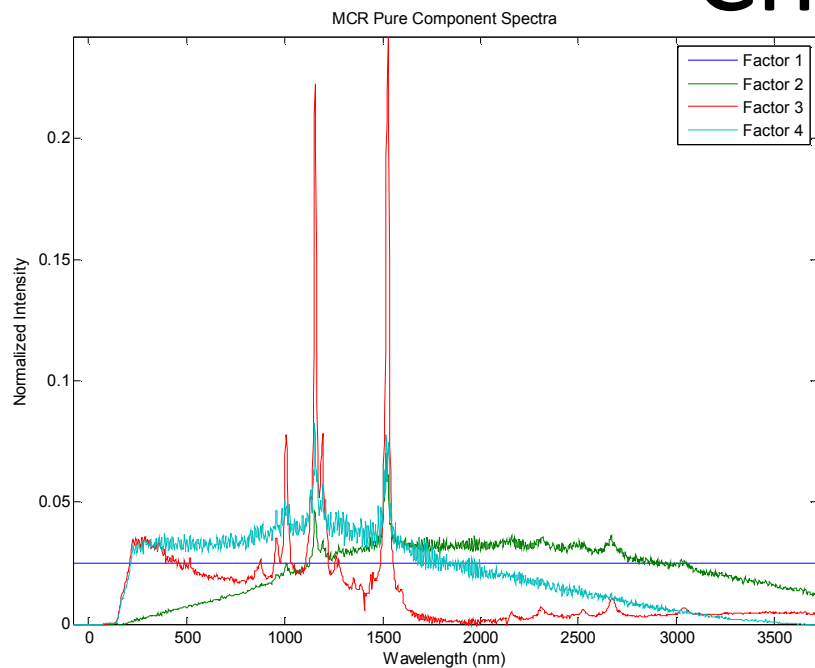
Imaging: Thomas Beechem, Anthony
McDonald

Analysis: Jeri Timlin

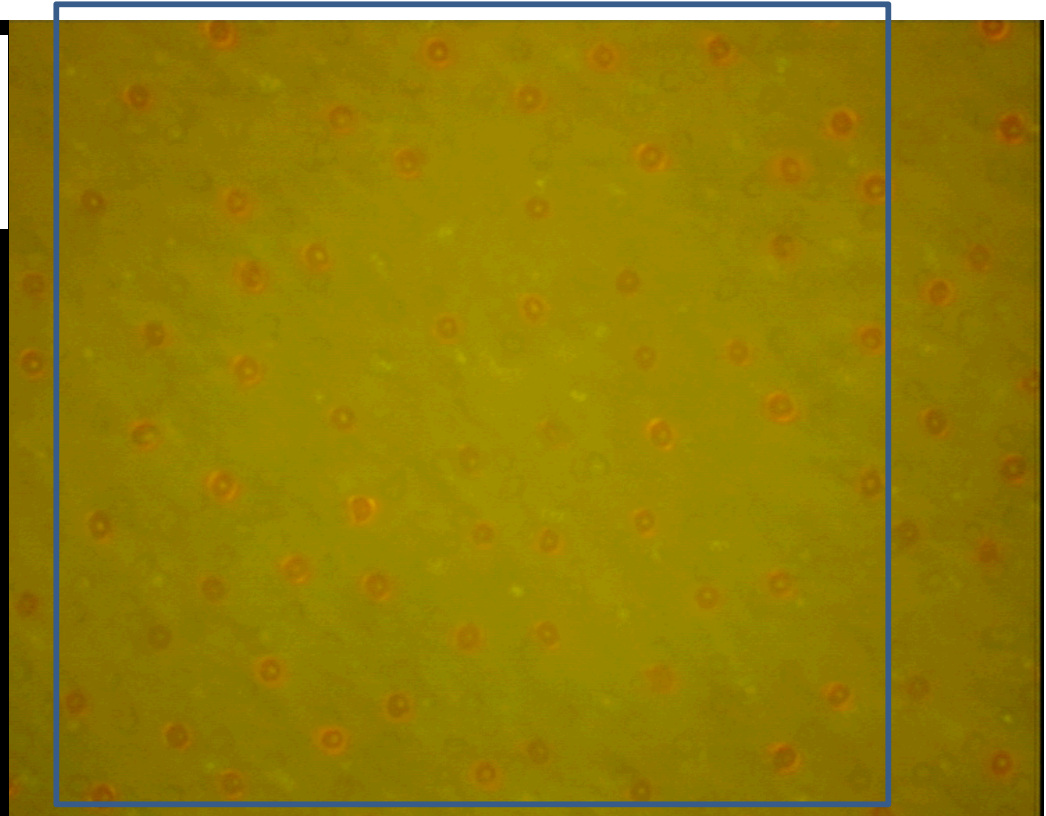
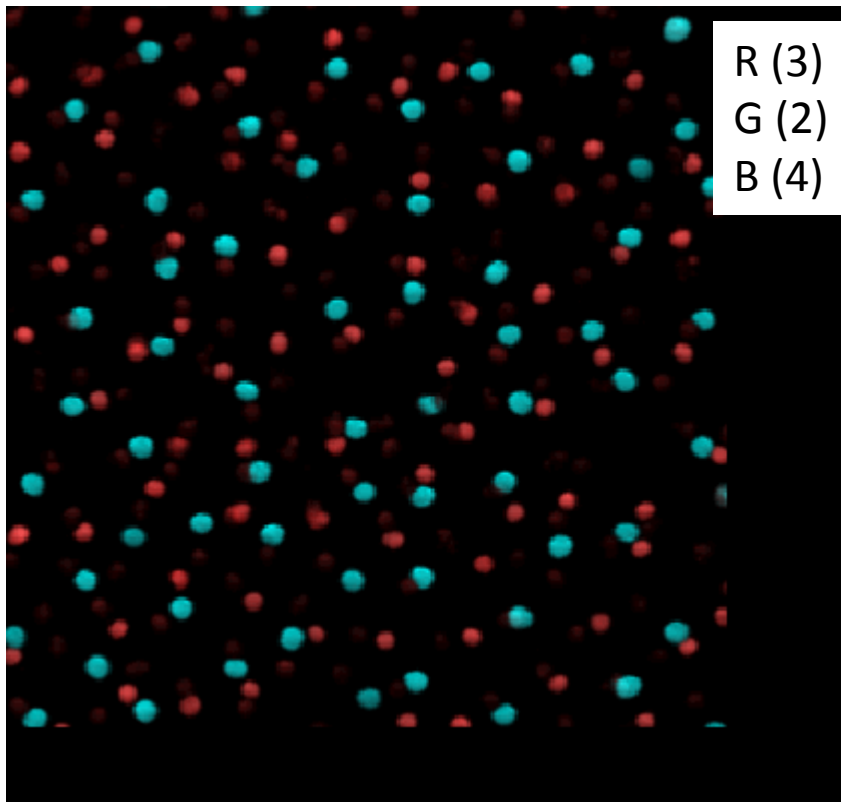


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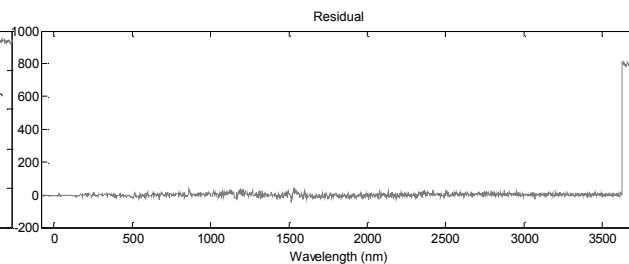
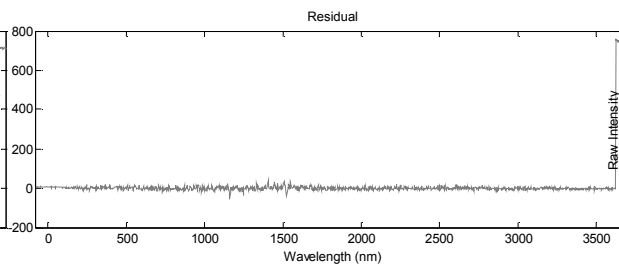
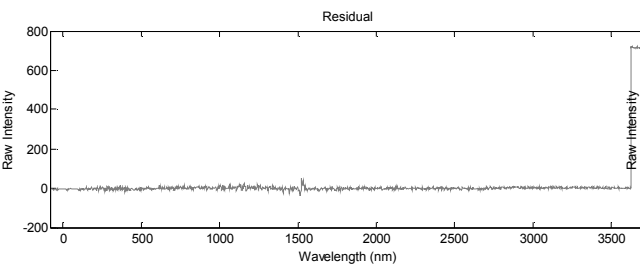
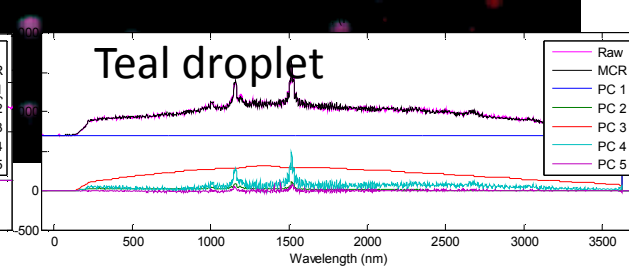
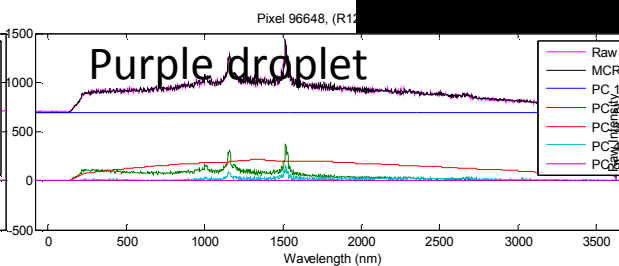
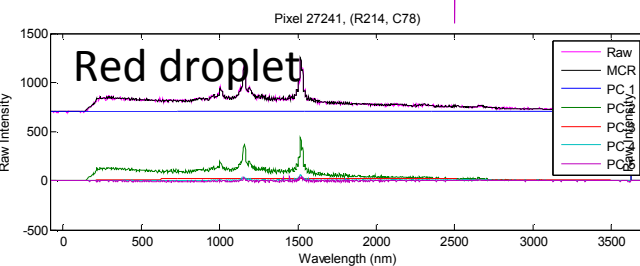
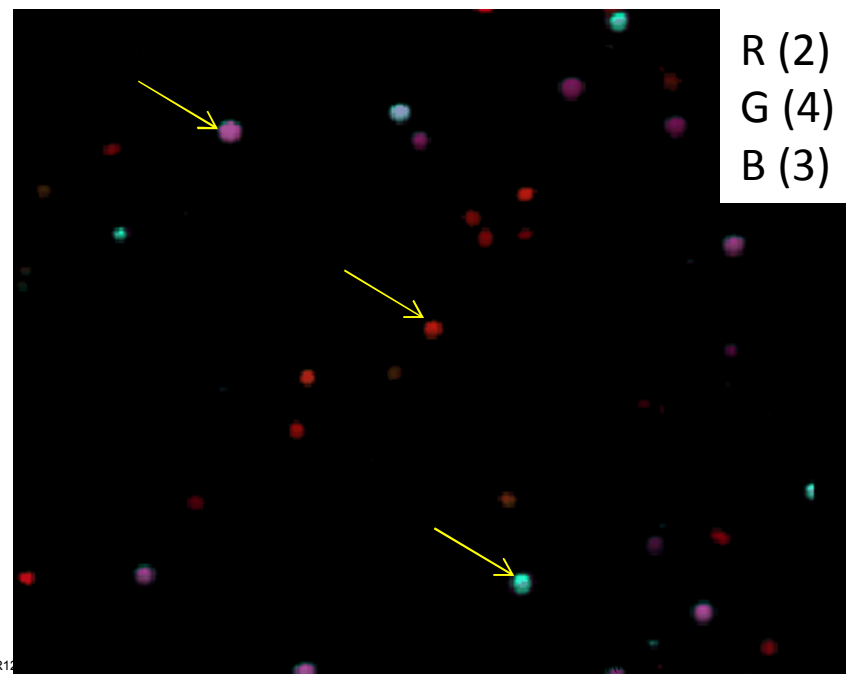
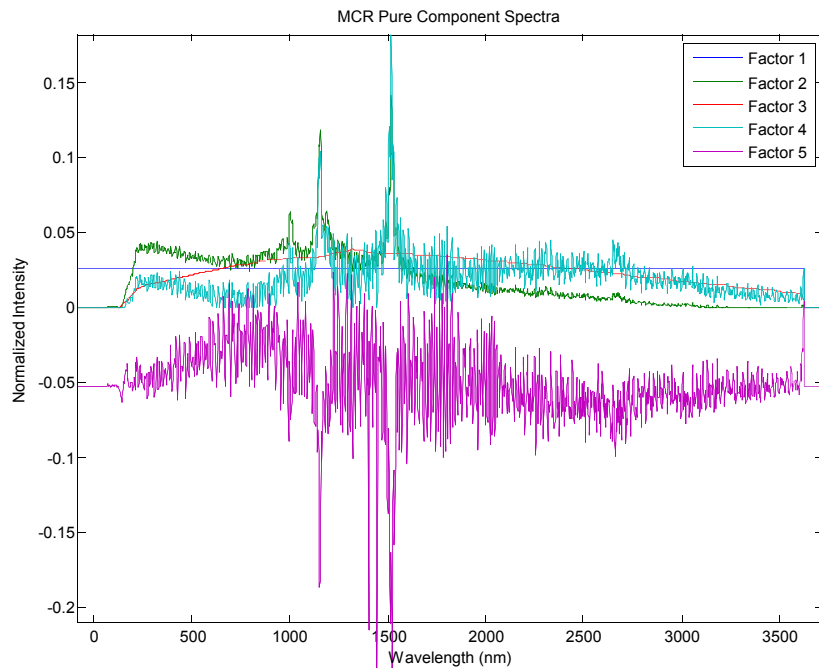
Chicken



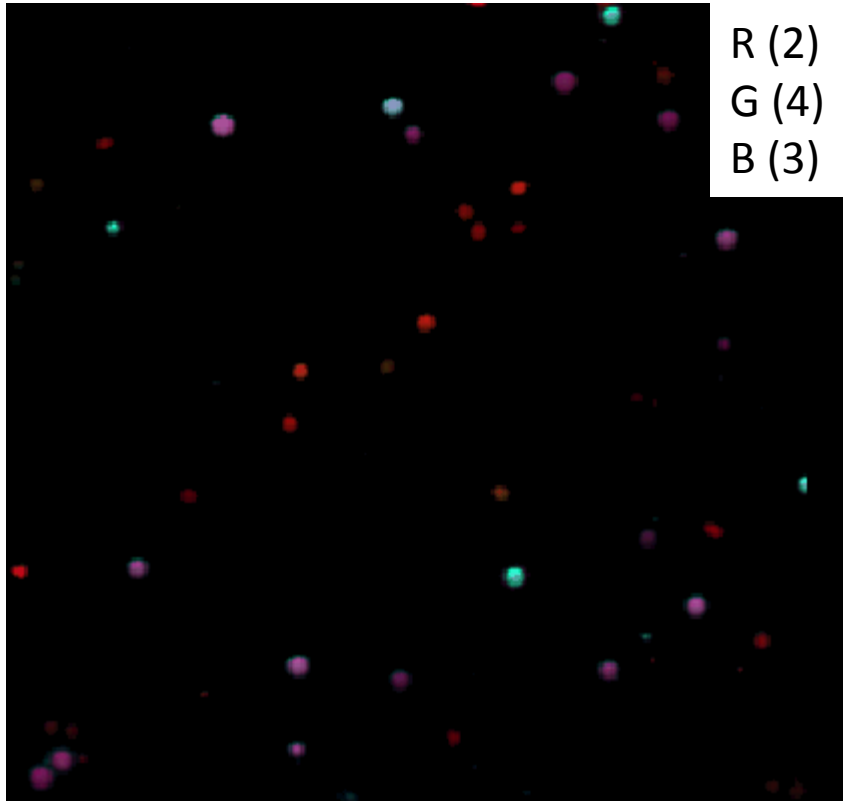
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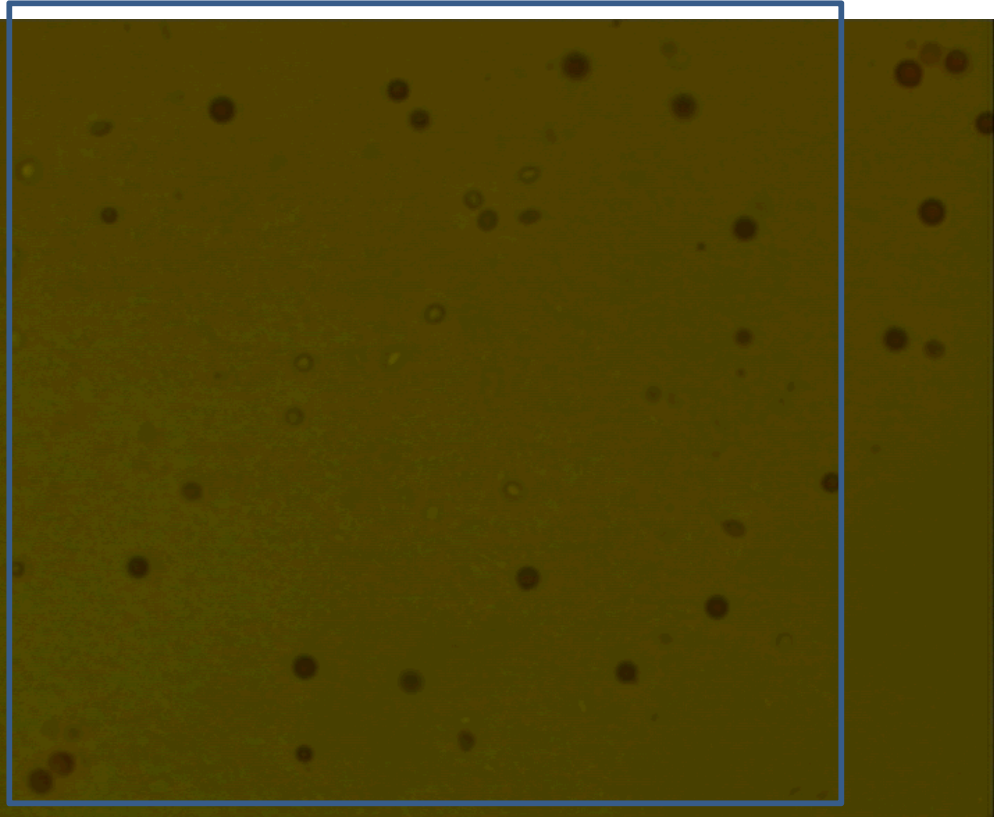
Mallard



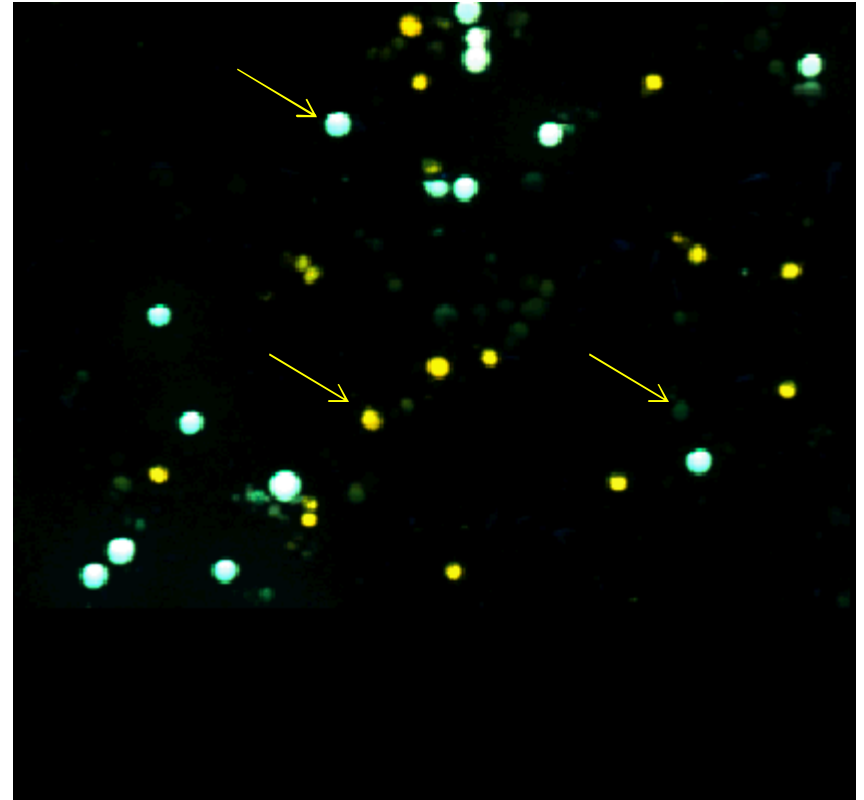
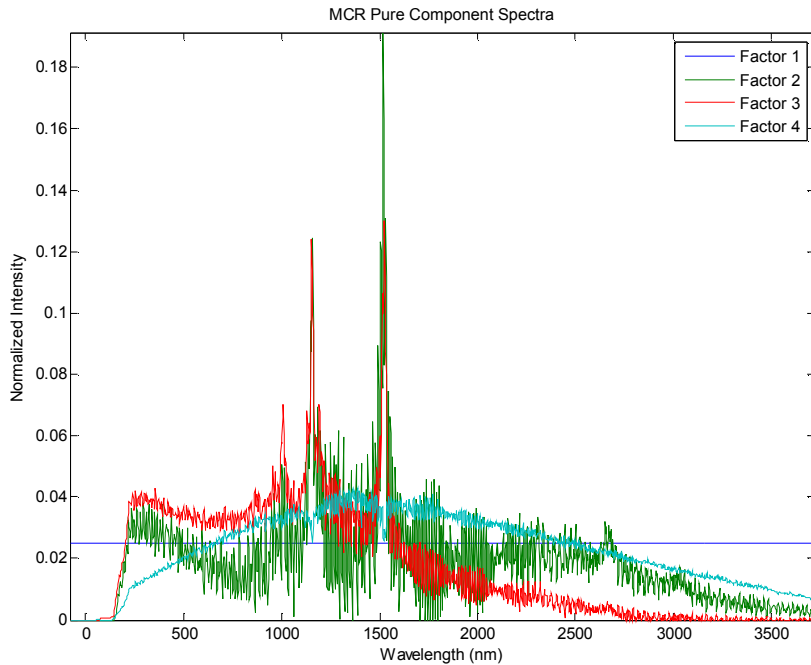
Mallard



R (2)
G (4)
B (3)

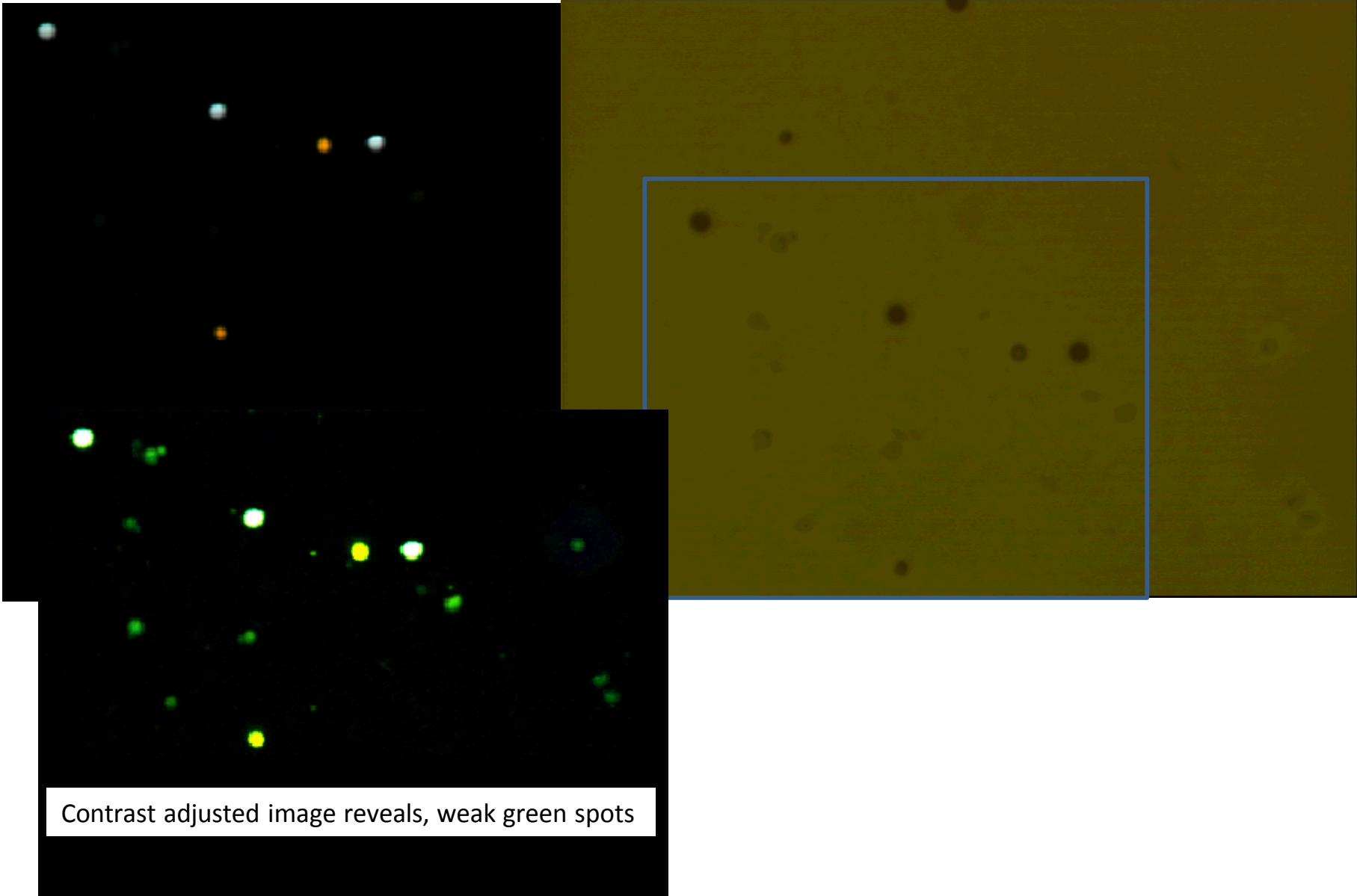


House Finch

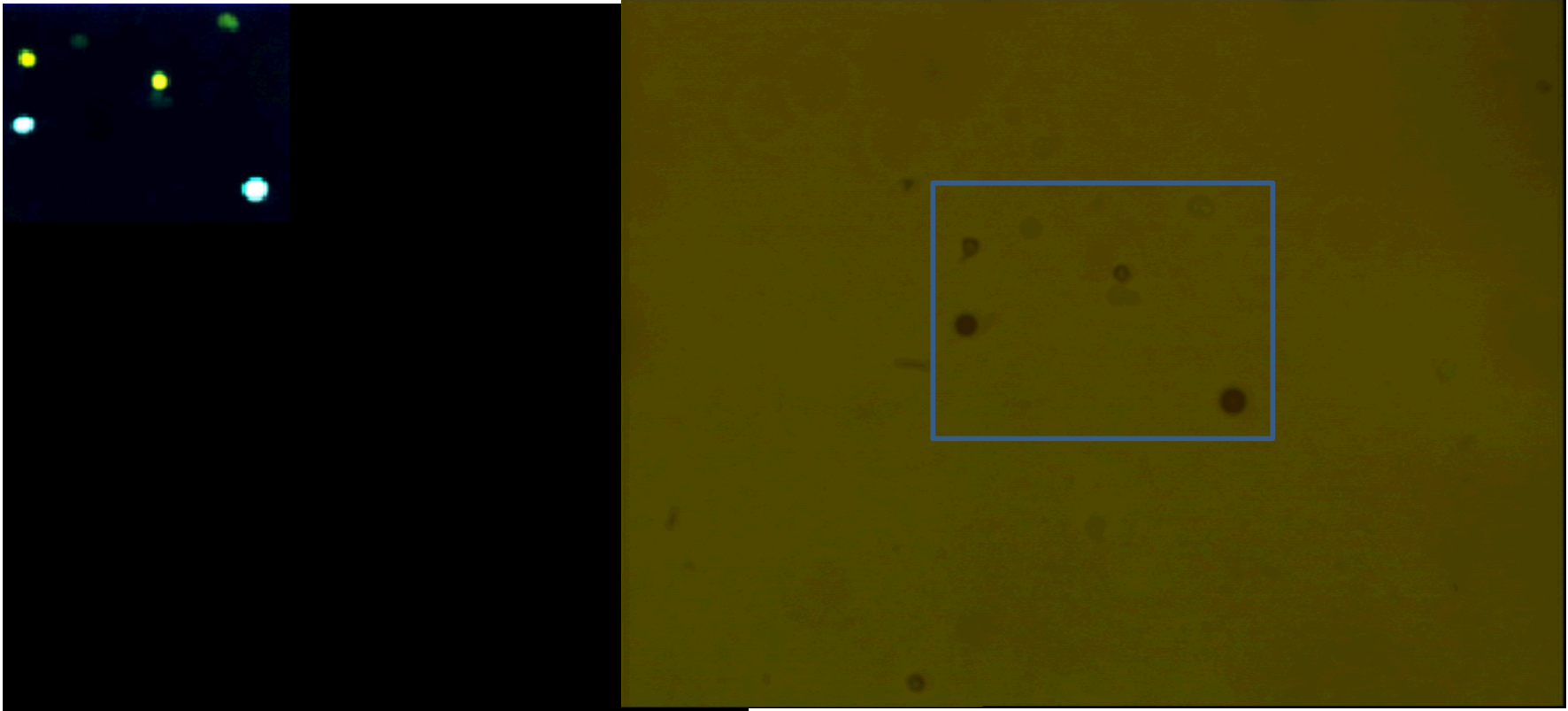


The green spots have a pretty decent residual associated with them. It looks like carotenoid shifted to 1550 cm^{-1} .

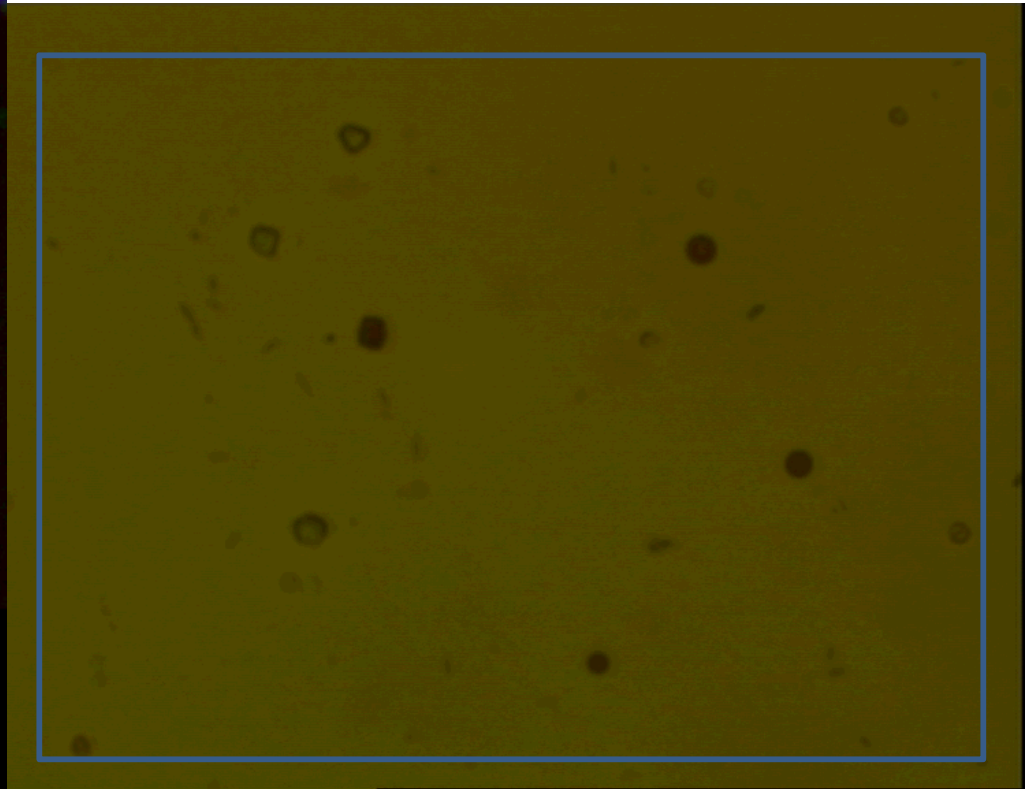
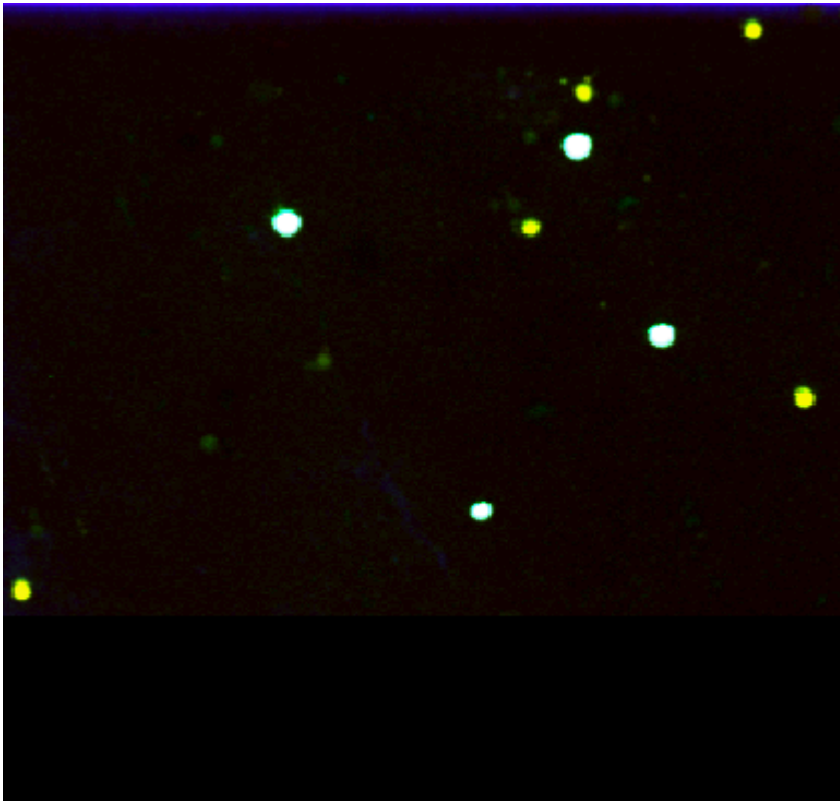
House Finch



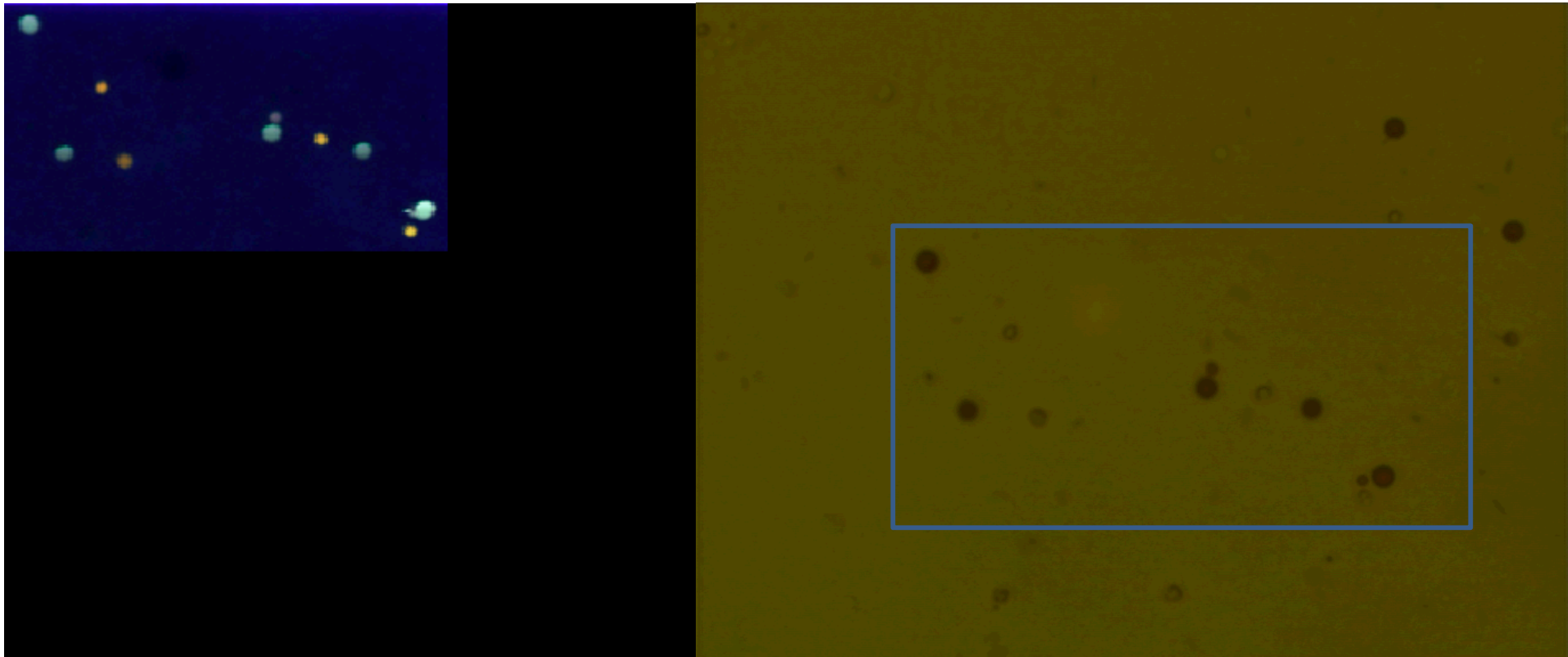
House Finch



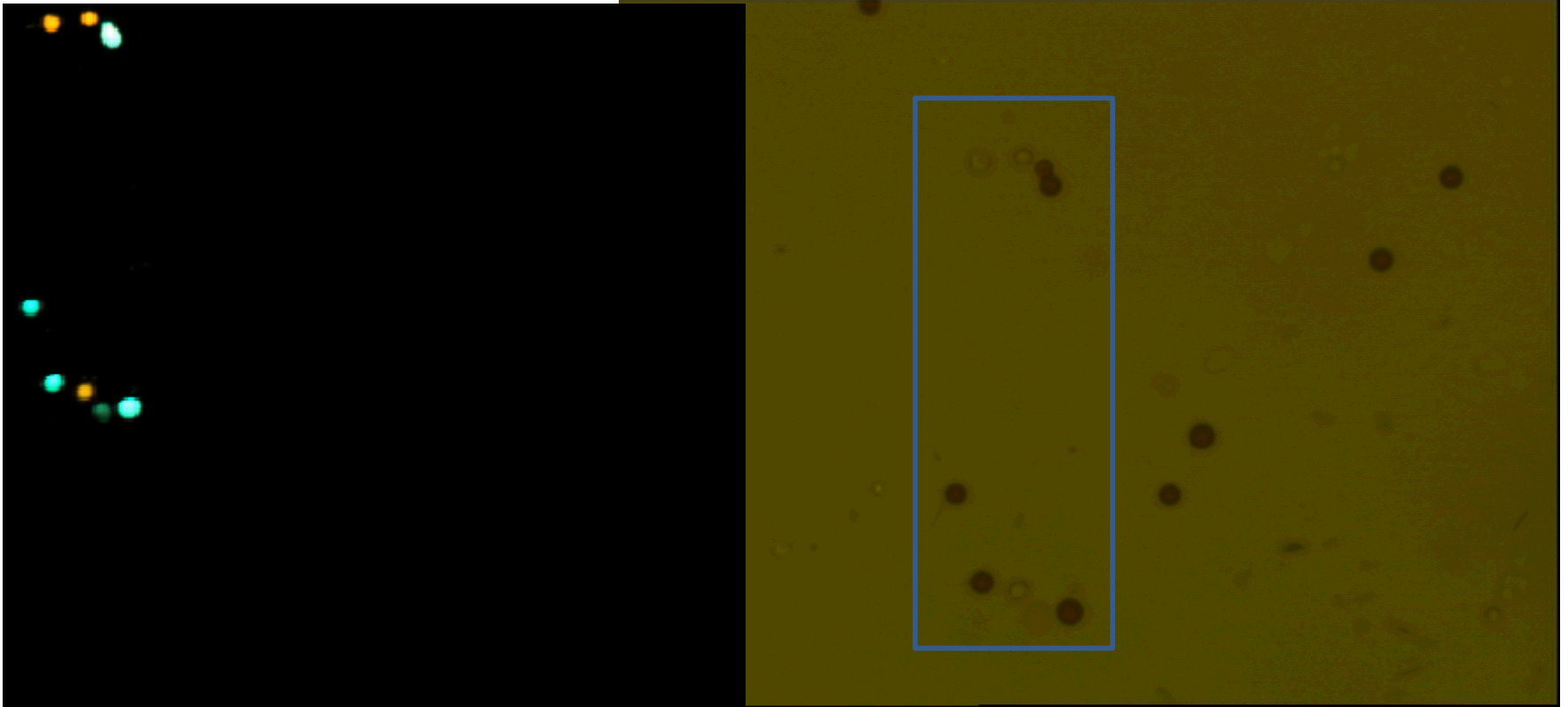
House Finch



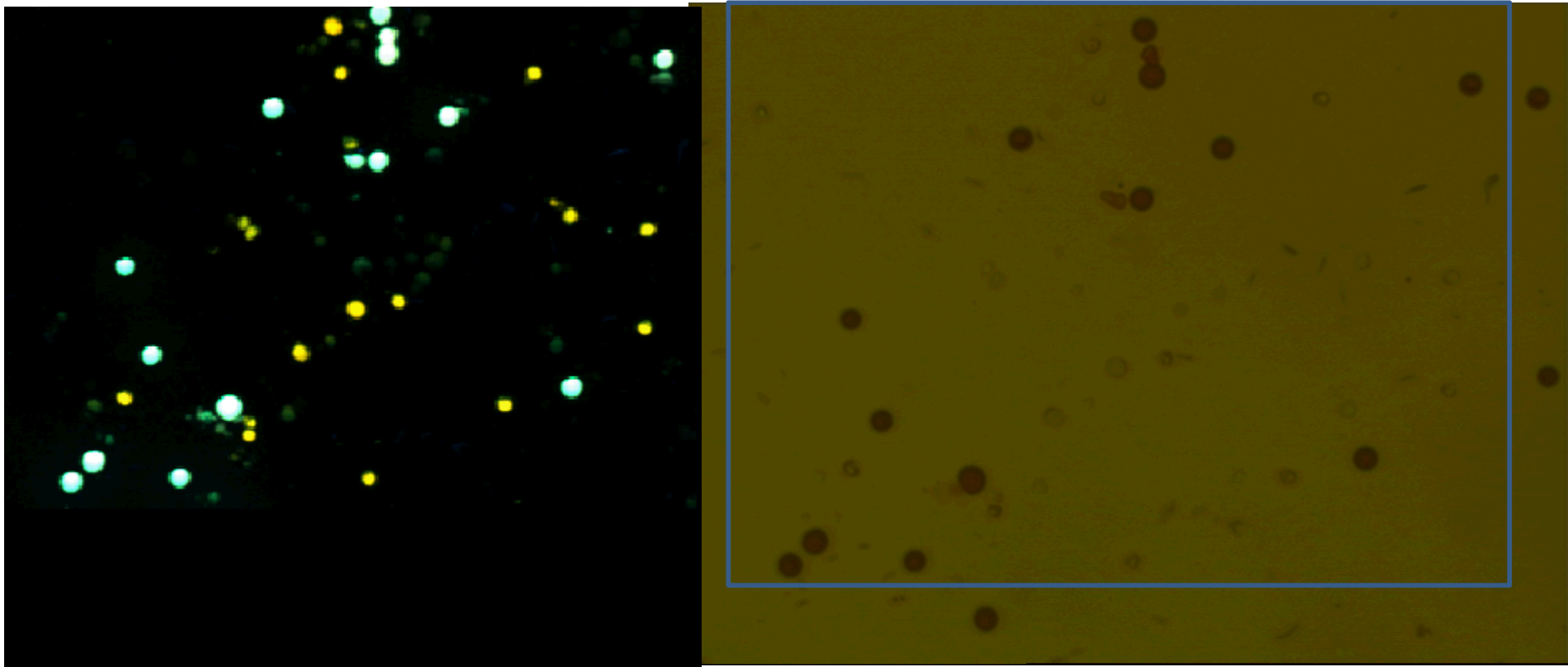
House Finch



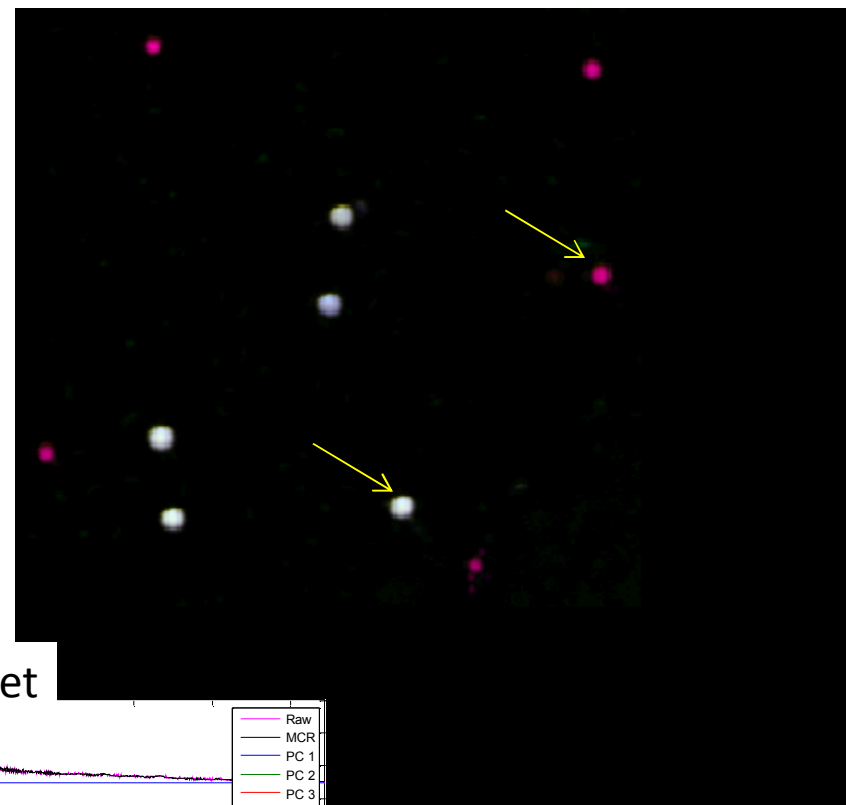
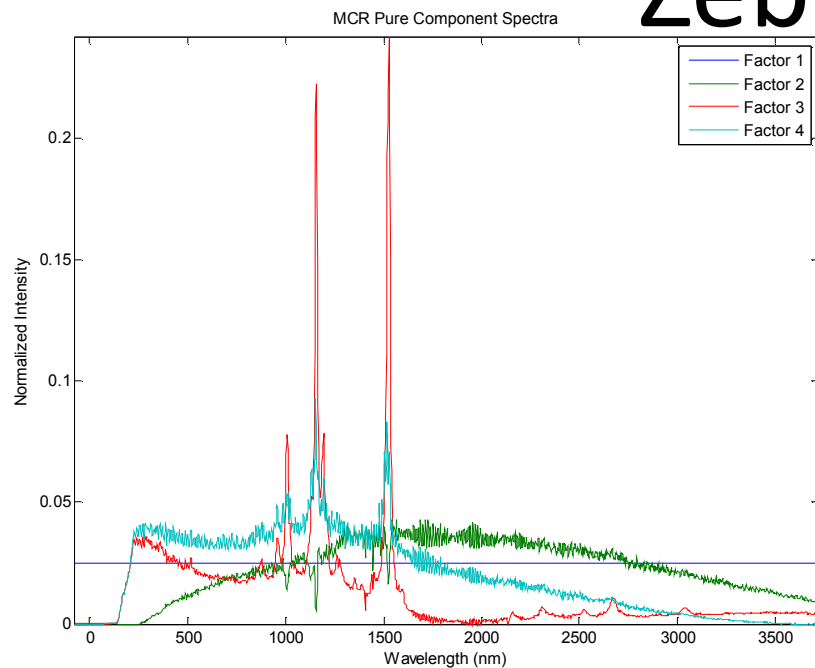
House Finch



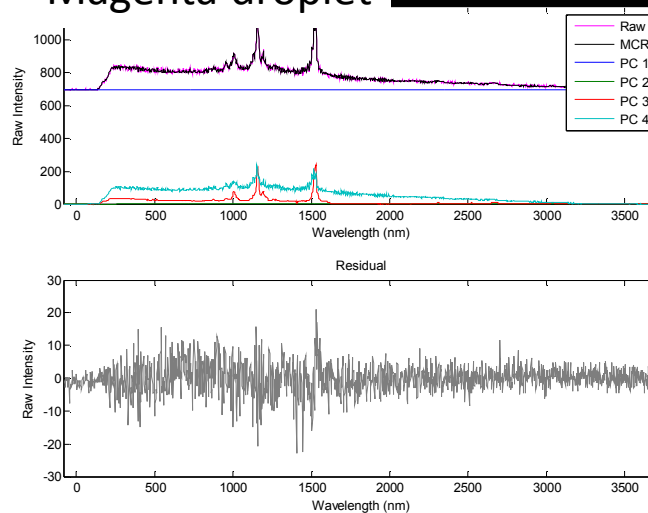
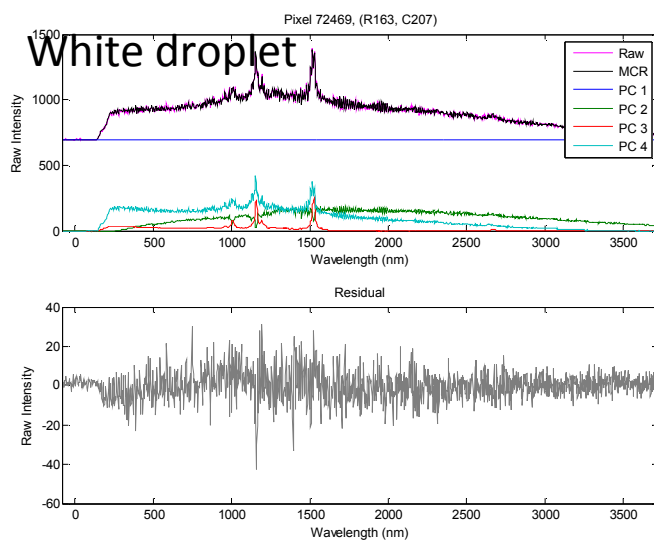
House Finch



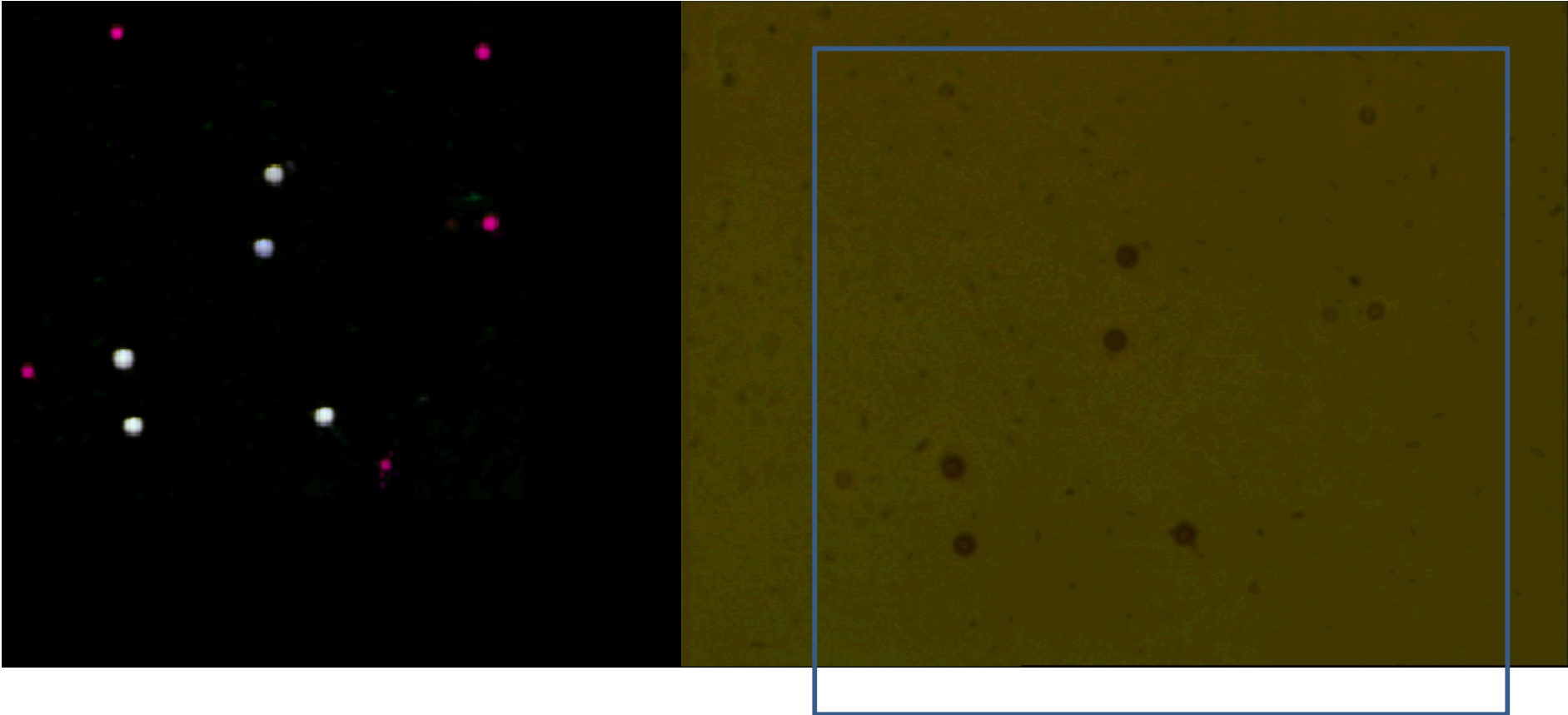
Zebra Finch



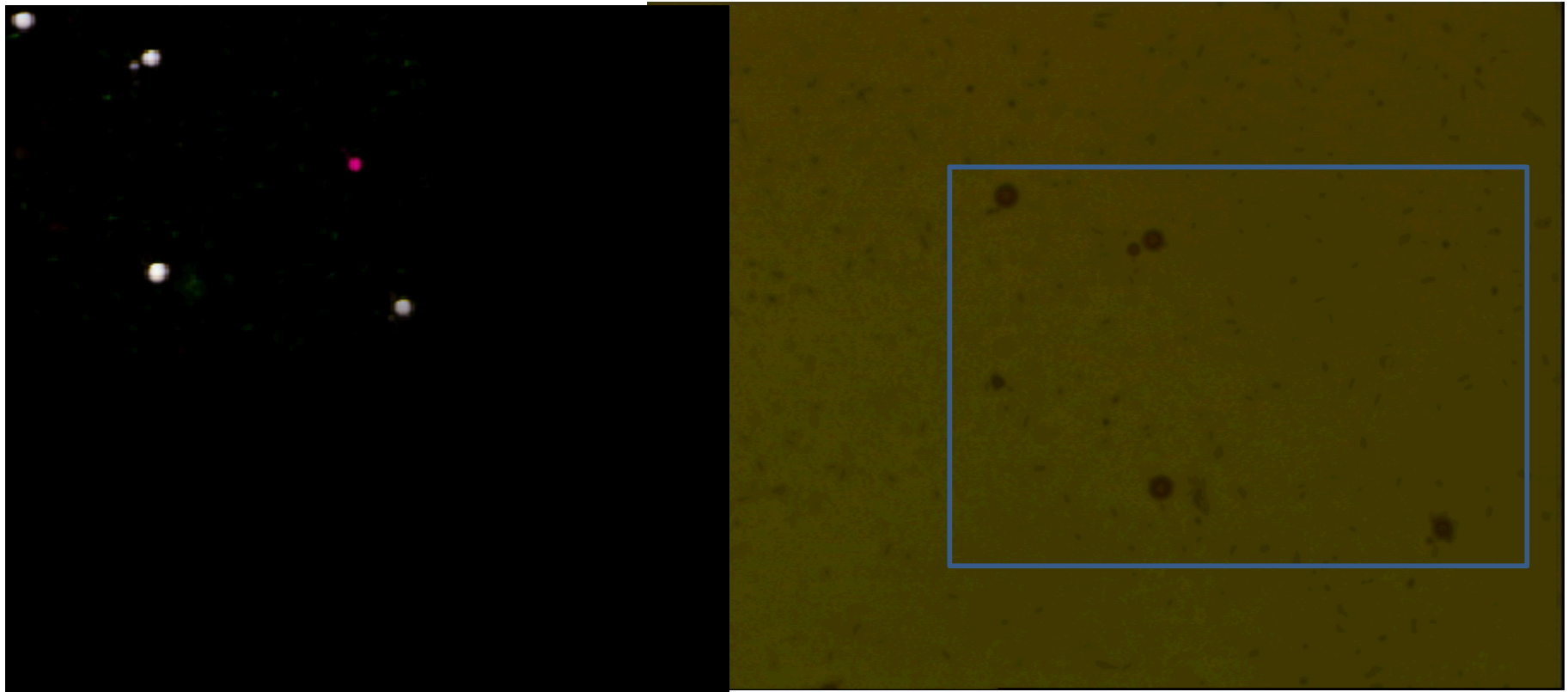
Magenta droplet



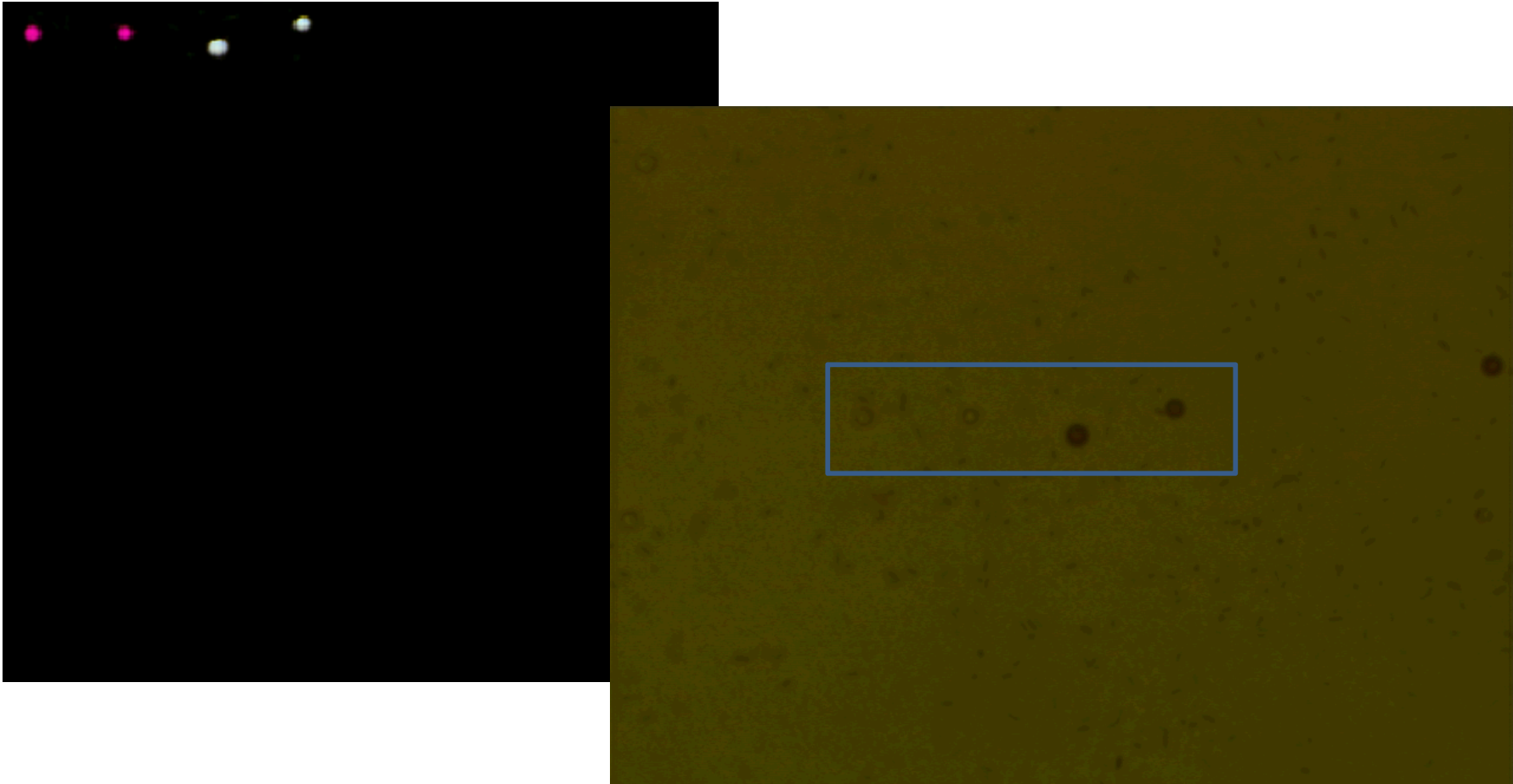
Zebra Finch



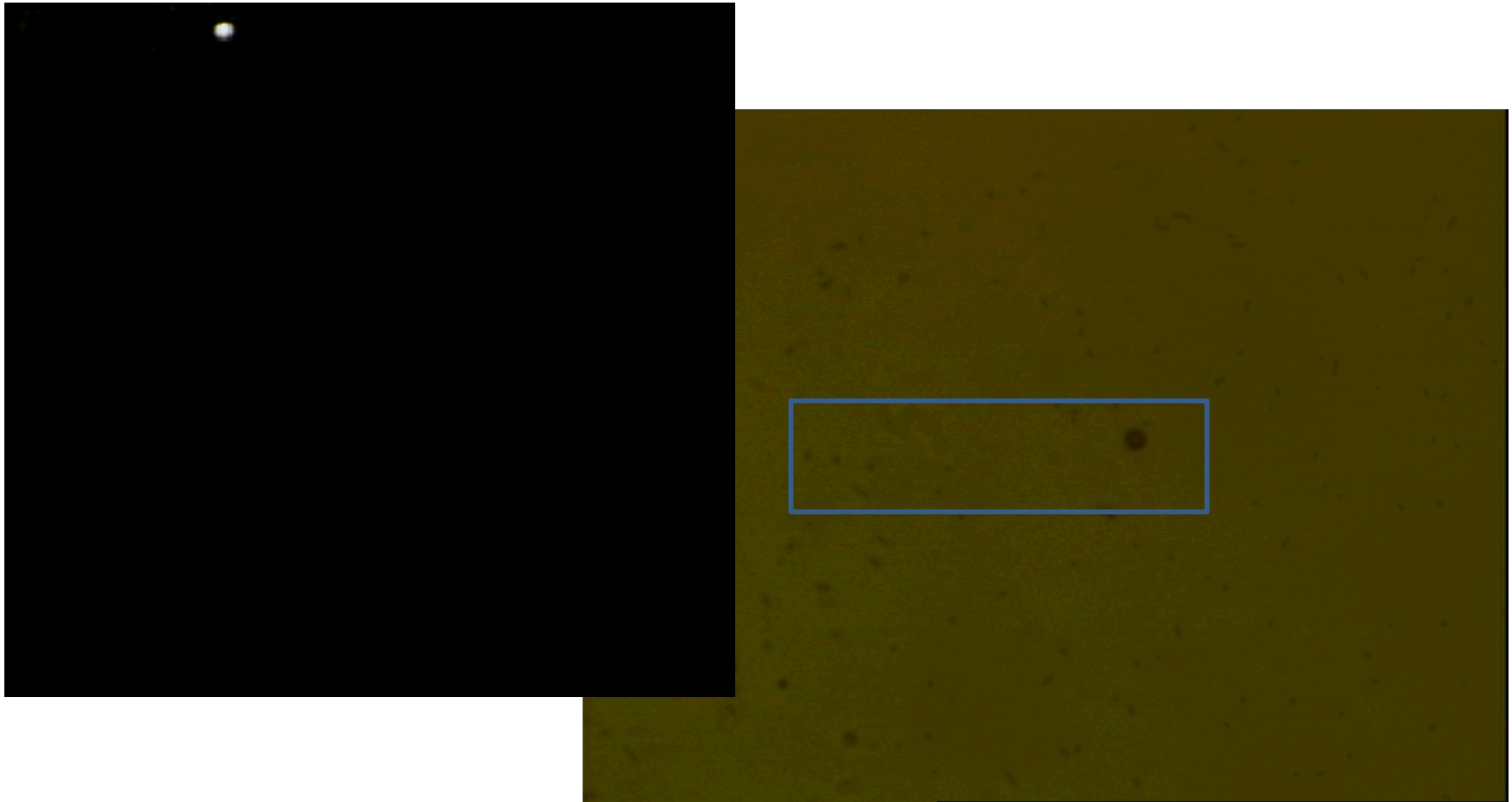
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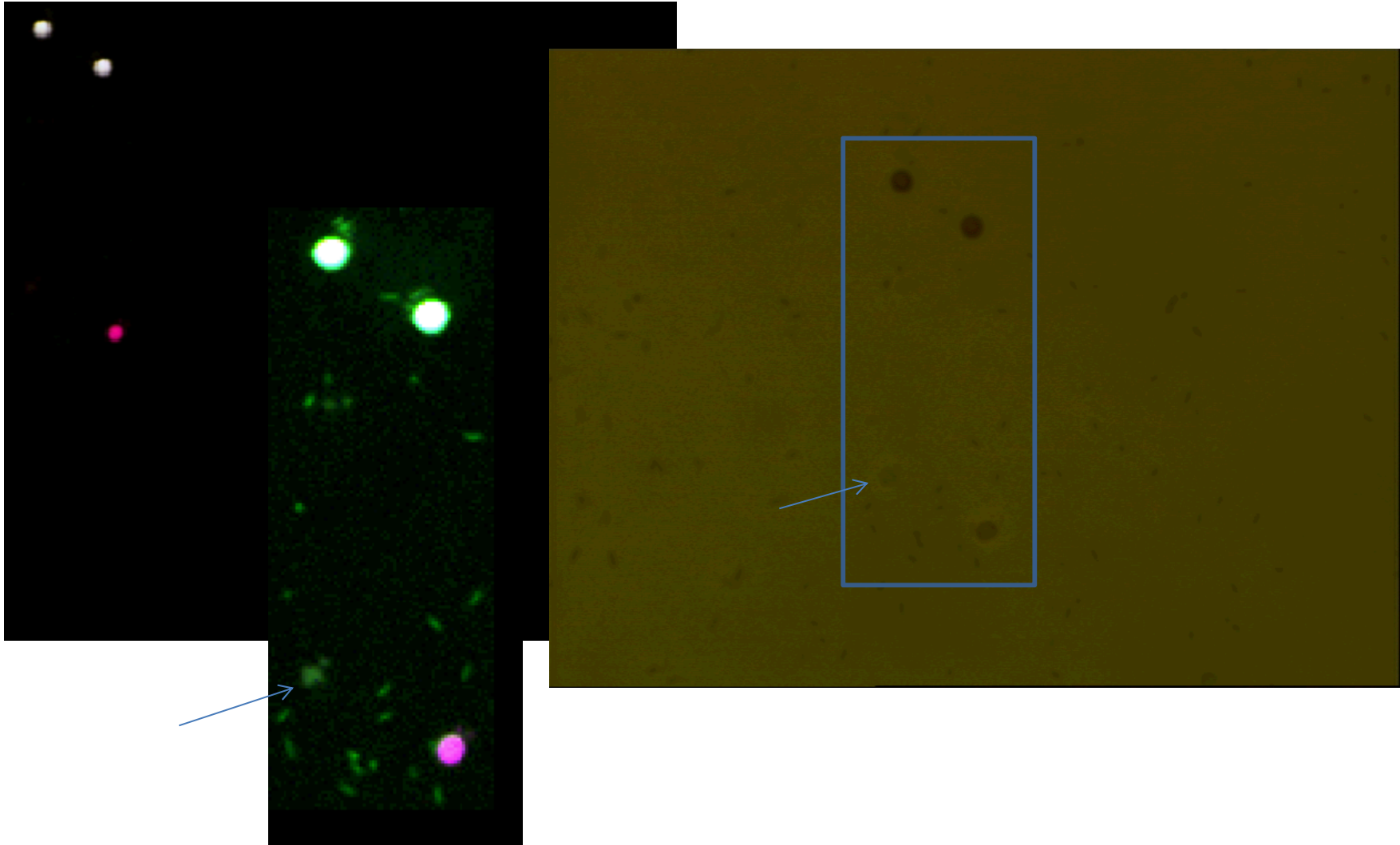
Zebra Finch



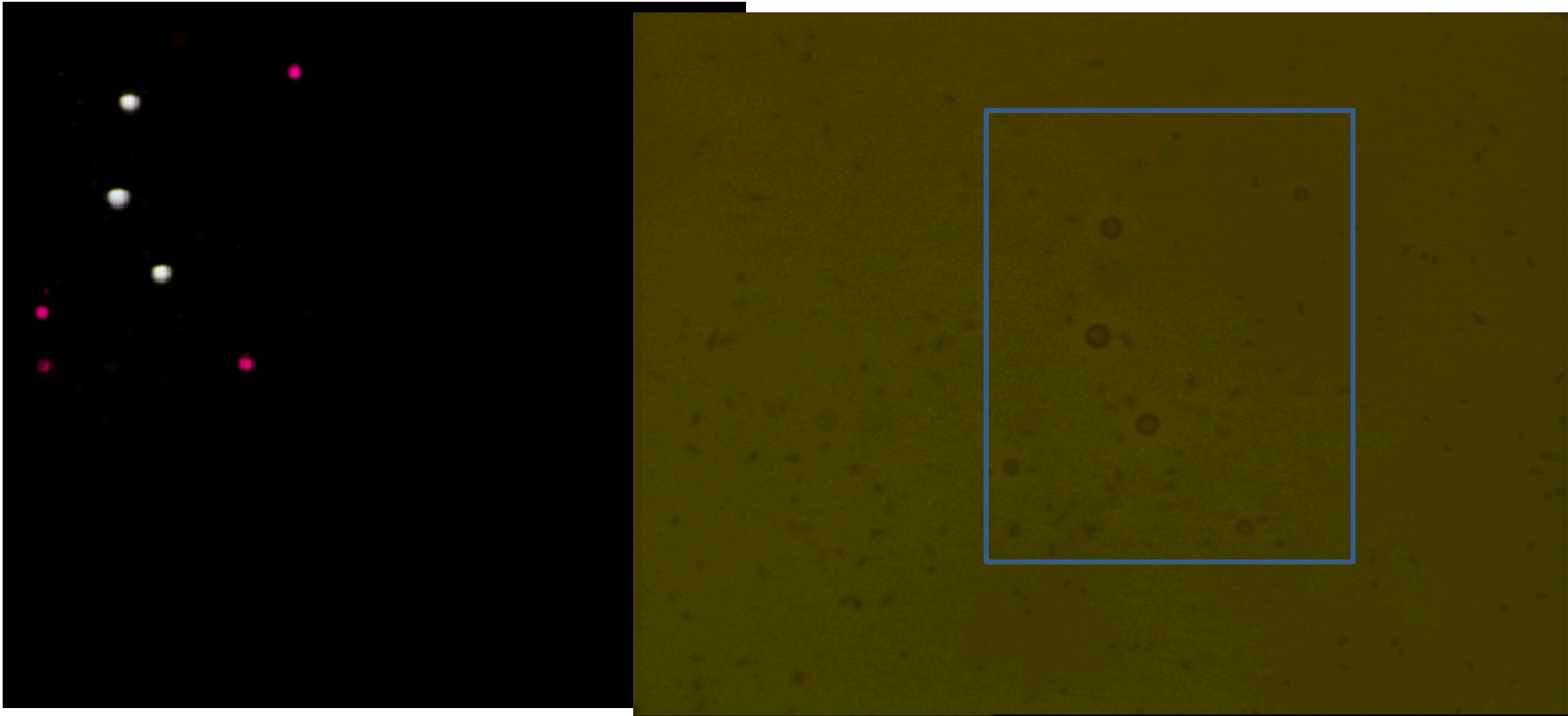
Zebra Finch



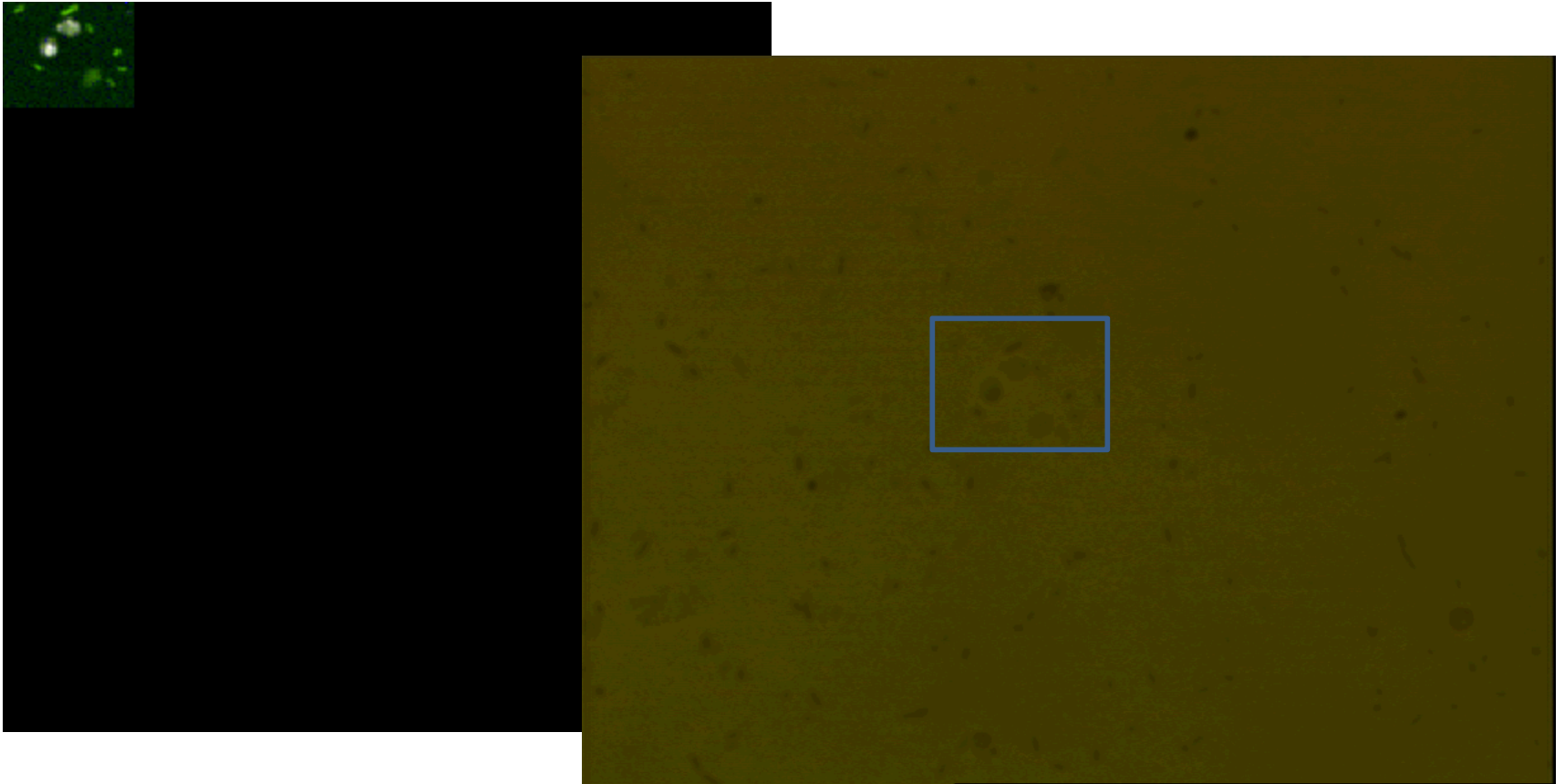
Zebra Finch



Zebra Finch



Zebra Finch



Summary Thoughts



- Chicken:
 - three spectral components (astaxanthin and two xanthophylls?)
 - two distinct populations of droplets (teal and red), with possibility of a third. If you look close there's a dim red and a brighter red population – these have a slight more contribution of the green spectrum. The green spectrum is not present to any significant degree in the bright red droplets.
- Mallard:
 - three spectral components (astaxanthin and a xanthophyll and something akin to autofluorescence which could be a carotenoid without resonance enhancement)
 - Three distinct droplet populations (red, purple, teal) and maybe a fourth (golden color, right in the center)

- House Finch:
 - Three spectral components (astaxanthin and a xanthophyll and something akin to autofluorescence which could be a carotenoid without resonance enhancement)
 - Three distinct droplet populations (green, yellow, and whitish/teal) though I am not sure the green is really from droplets. It could be degraded carotenoid because the green spots have a very prominent spectral residual at $\sim 1650 \text{ cm}^{-1}$ that is not well explained by the spectra the model explains.

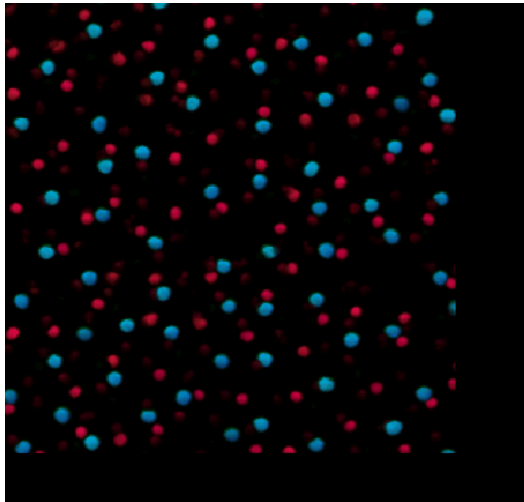
- Zebra Finch:
 - Three spectral components (astaxanthin and a xanthophyll and something akin to autofluorescence which could be a carotenoid without resonance enhancement)
 - Three distinct droplet populations (white, magenta, and green (again you have to really look close for these and it could be degraded carotenoid))

More Views

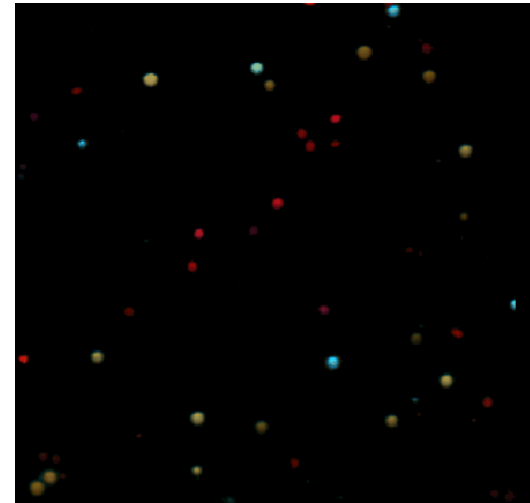
Comparison of Colors

R= Astaxanthin (component 3), G = broad AF (component 2), B= other xanthophyll carotenoid (component 4)

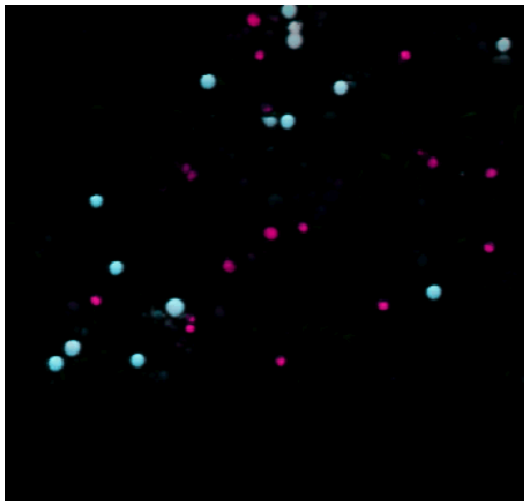
Chicken



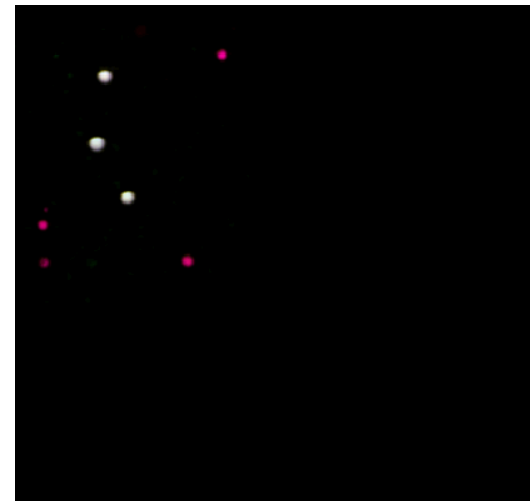
Mallard



House Finch



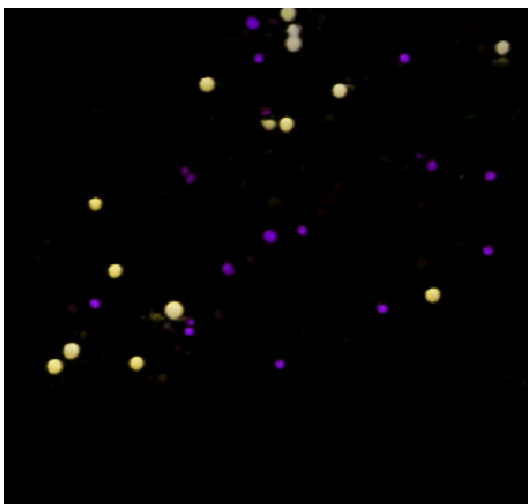
Zebra Finch



* In this image Component 4 is red and component 3 is blue. See alternate view next slide.

Each image is scaled independently min to max per component. Color changes mean relative intensity changes between species.

House Finch



I am not sure of the spectral assignment for the house finch. This alternate view assigns Component 3 to the astaxanthin and Component 4 to some other xanthophyll carotenoid and would result in an image like this. I believe the image on the other side is correct.