

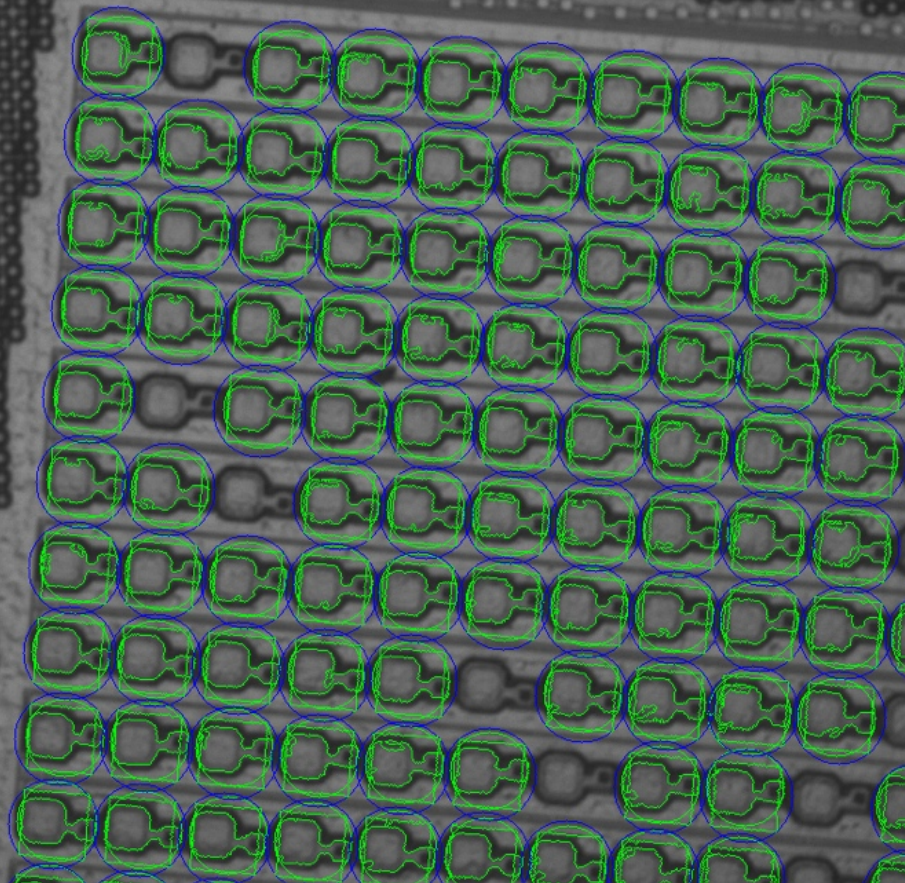


UNIVERSITÉ
DE GENÈVE



PIXELSHOP

Flip-chip alignment software



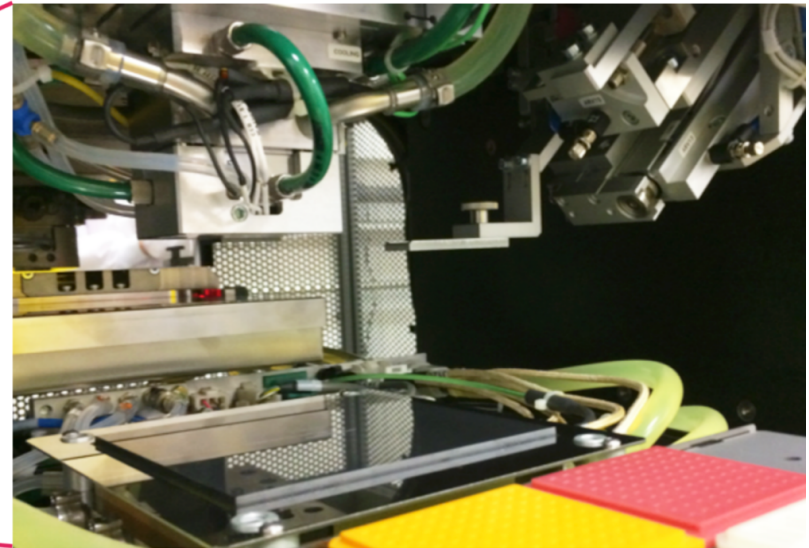
WG vertex meeting
10/03/2016

Mateus Vicente
Mathieu Benoit

Overview

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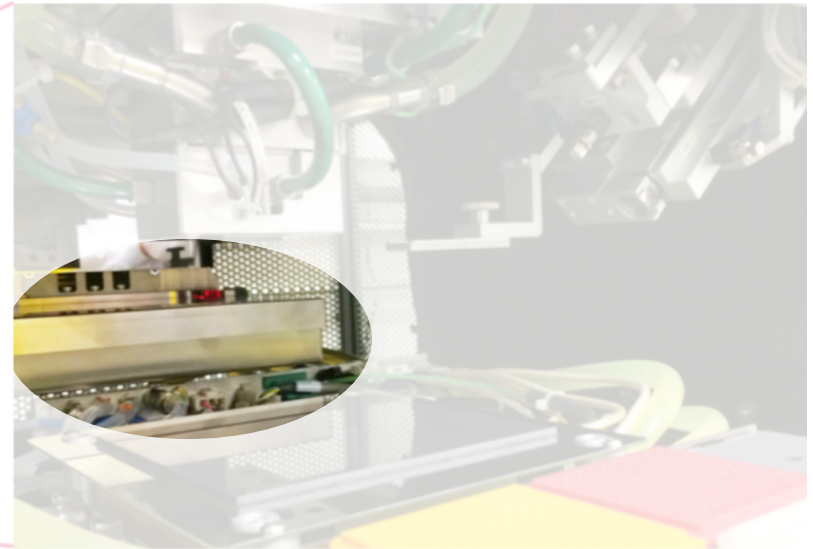
- ACC μ RA™ 100 flip-chip machine
 - ▣ Up/Down camera to align readout chip and sensor
 - ▣ Correct alignment by visual and manual control of the chip/sensor



Overview

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- ACC μ RA™ 100 flip-chip machine
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Overview

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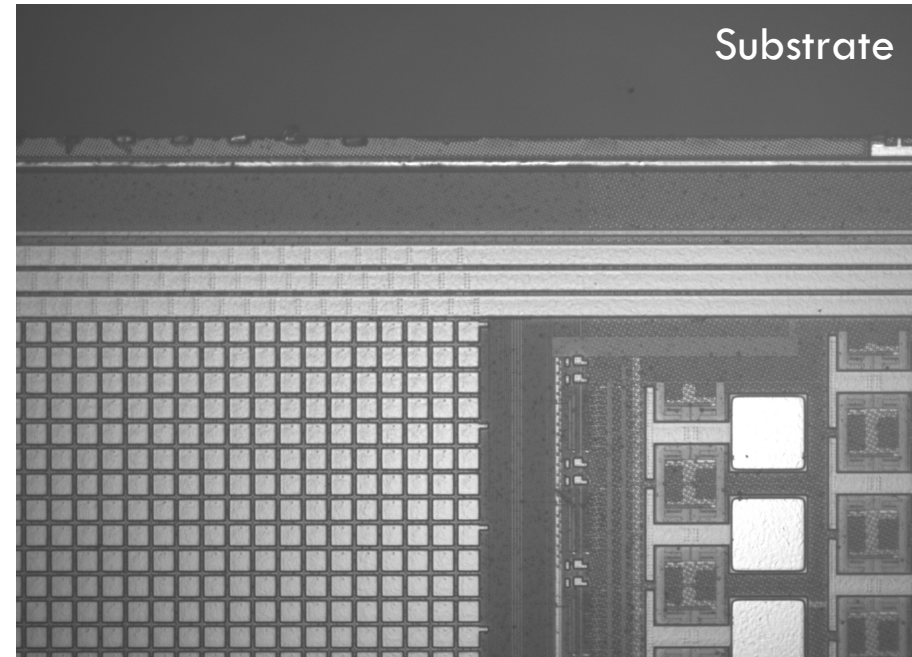
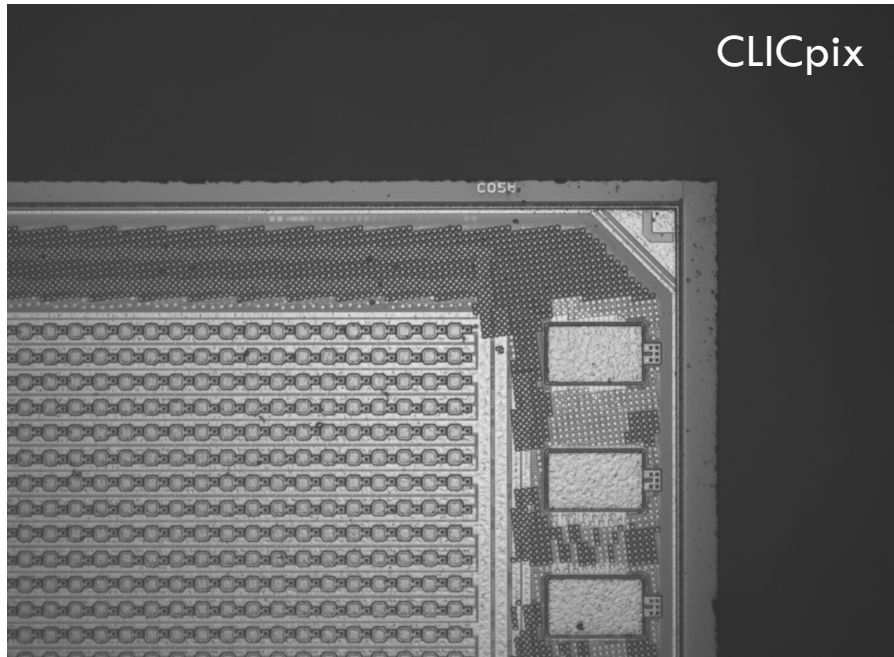
- ACC μ RA™ 100 flip-chip machine
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CLICpix + Substrate flip-chip

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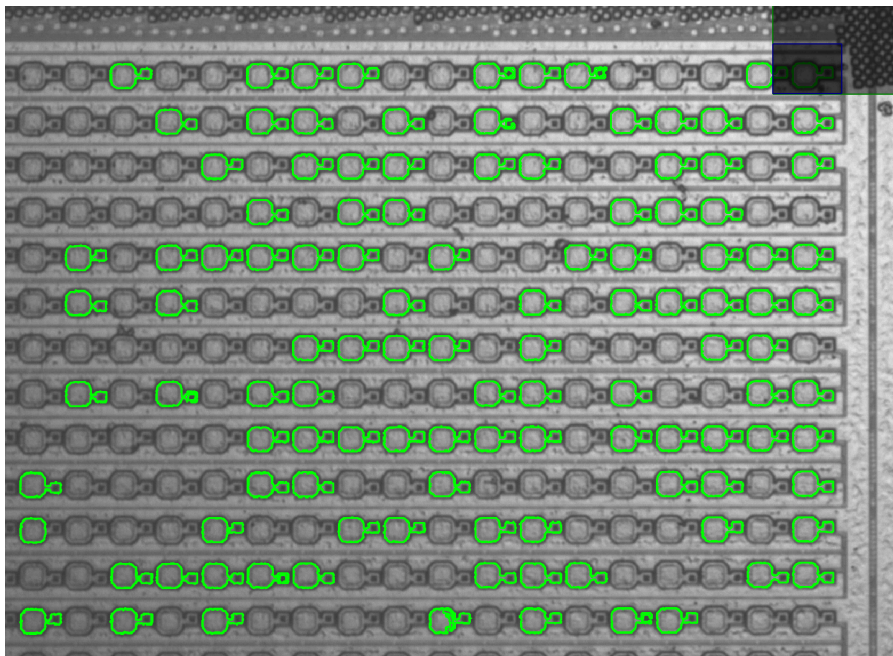
- Flip-chip(ing) CLICpix chip
 - ▣ 25 um pixel pitch



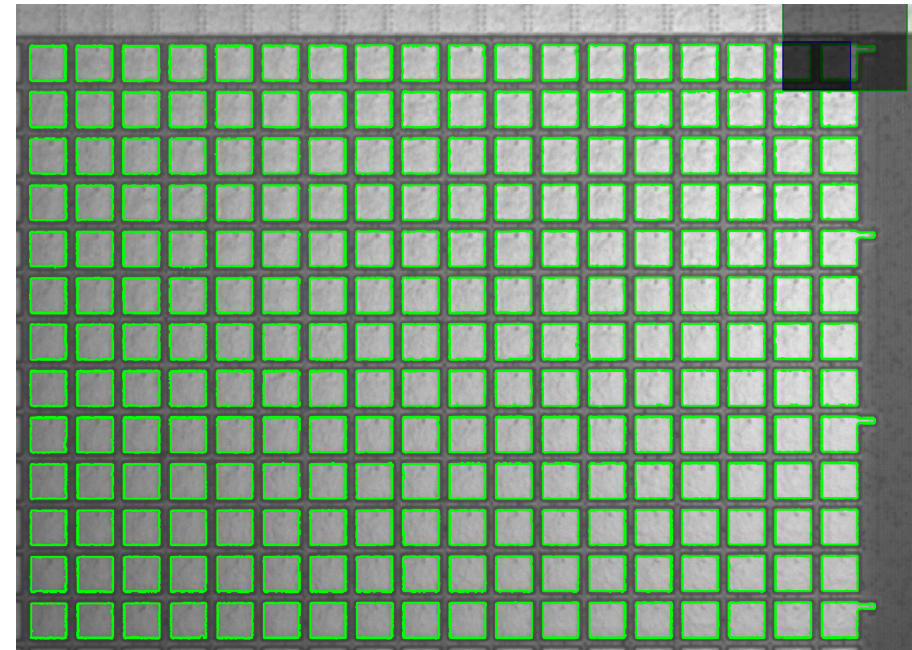
CLICpix + Substrate flip-chip

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- Pixel pattern recognition
 - ▣ Using OpenCV framewrok



CLICpix

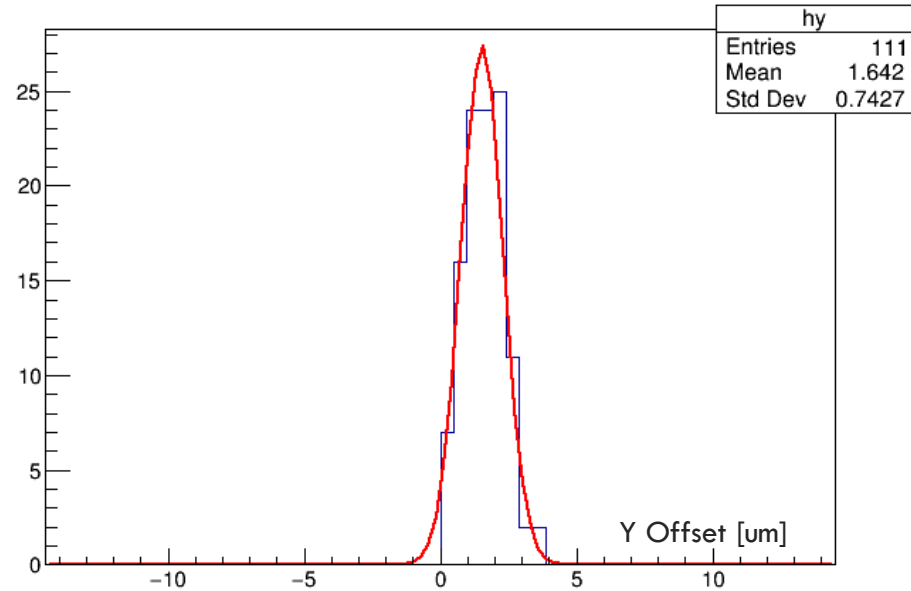
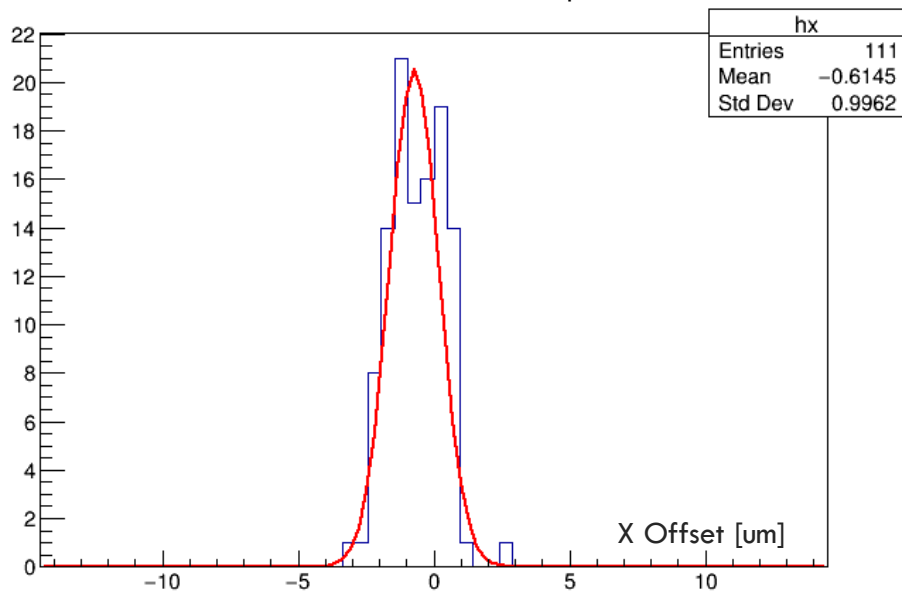


Substrate

CLICpix + Substrate flip-chip

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- Pixel pattern recognition
 - ▣ Using OpenCV framewrok
- Determine (X,Y) offset between chip and substrate
 - ▣ $(X,Y)_{\text{Substrate}} - (X,Y)_{\text{Chip}}$

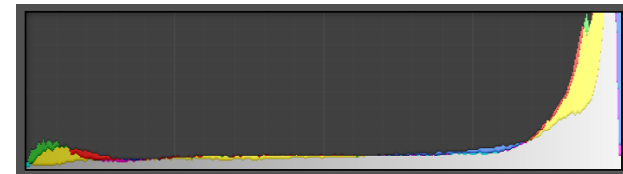
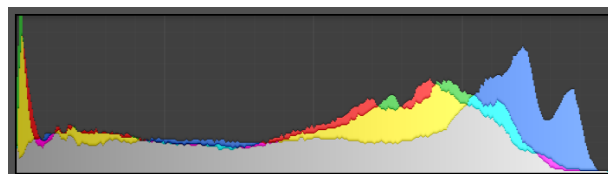
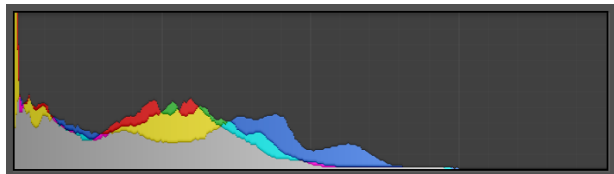
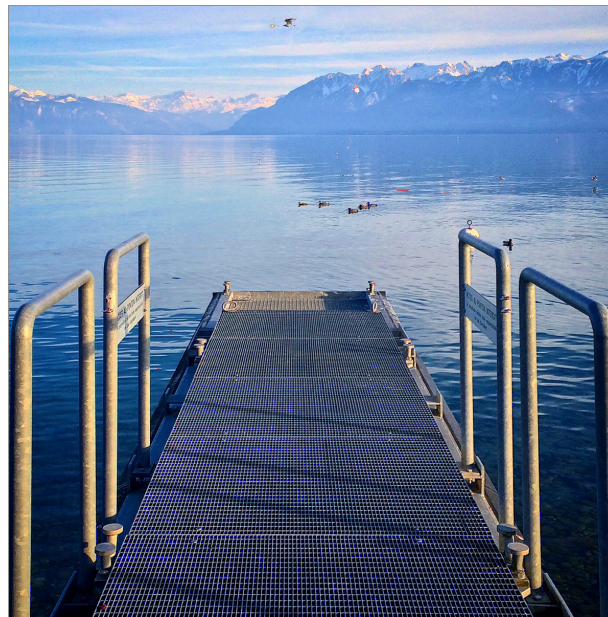
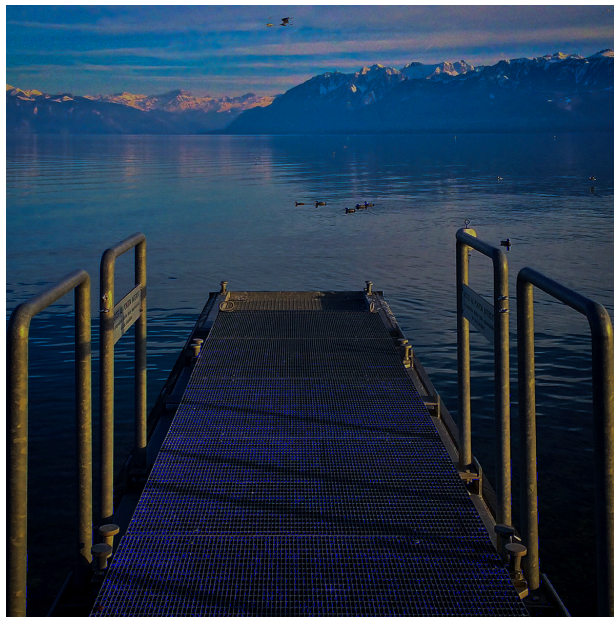


Enhance pixel recognition

picture manipulation

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□ Picture histogram

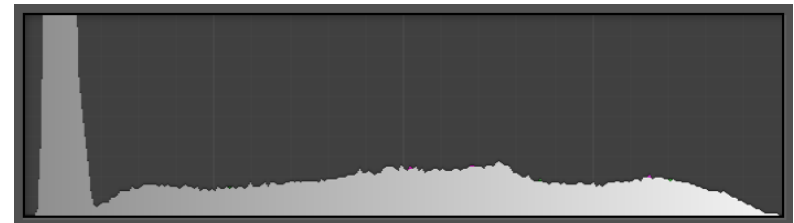
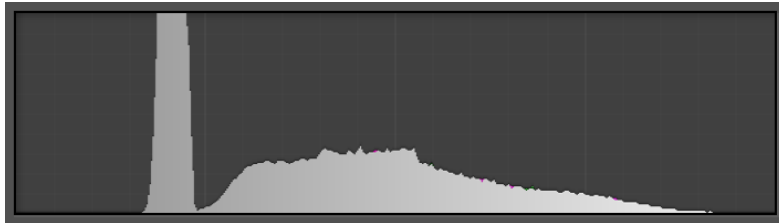
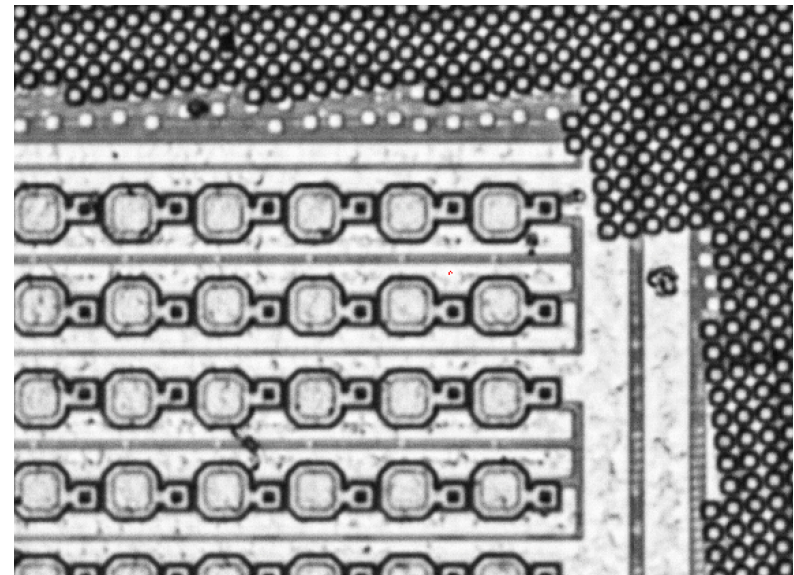
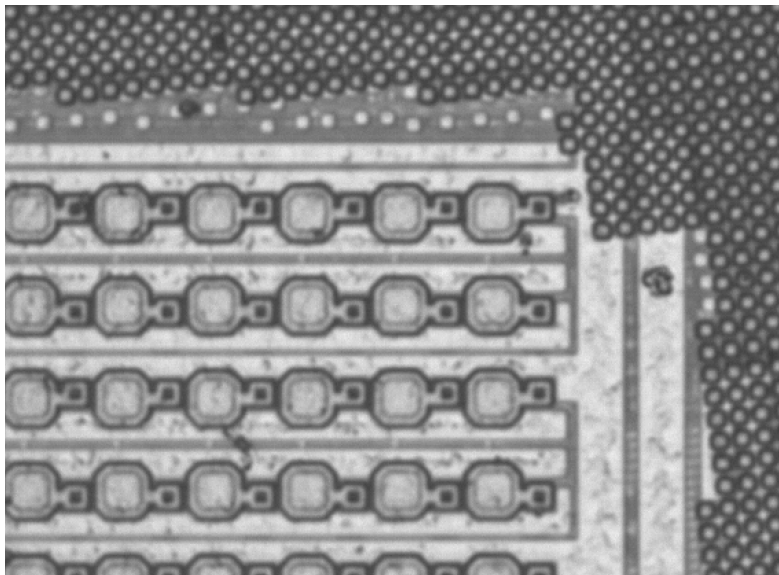


Enhance pixel recognition

picture contrast, brightness, etc...

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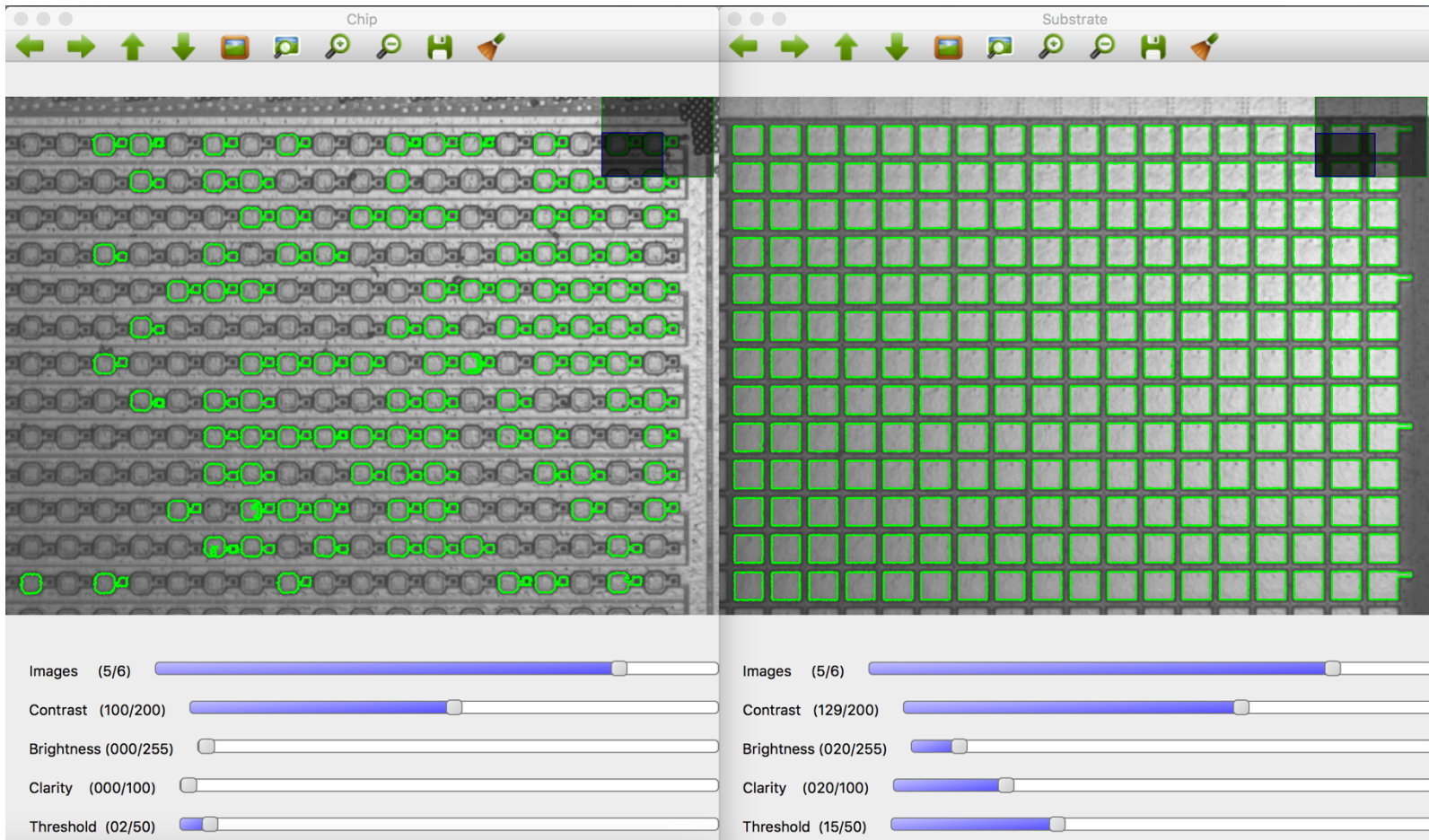
- Using professional software



Enhance pixel recognition

PixelShop - Before

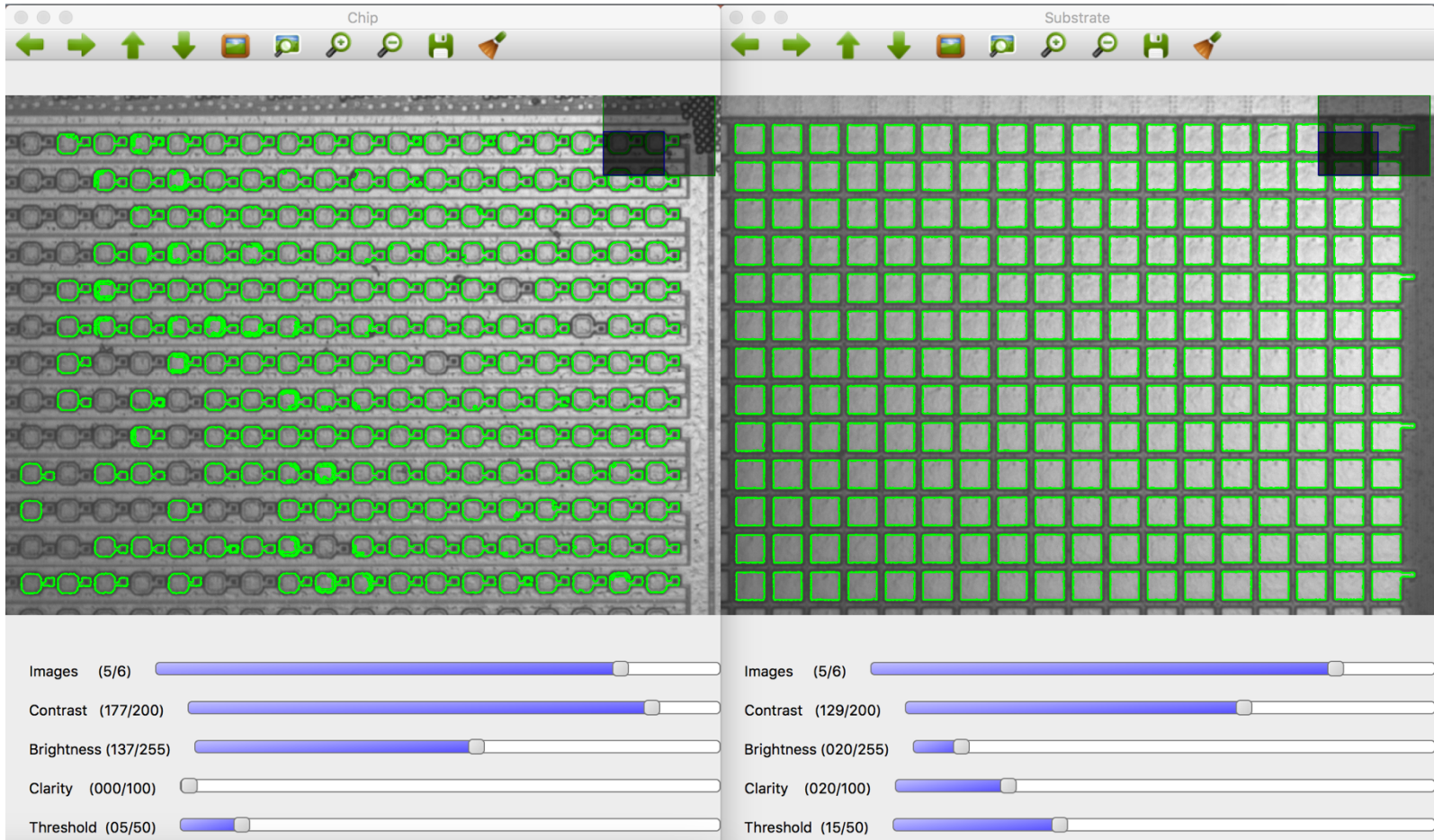
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Enhance pixel recognition

PixelShop - After

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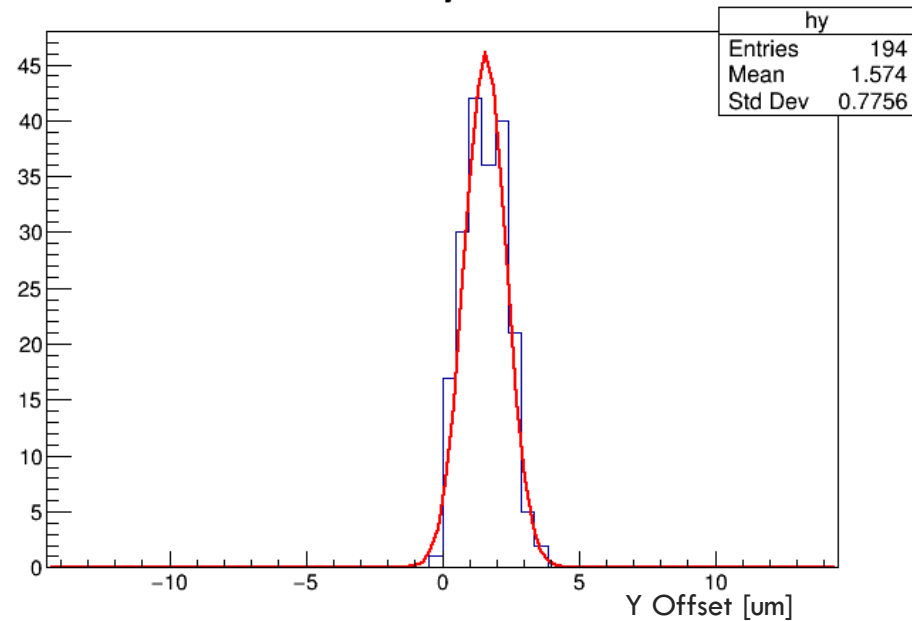
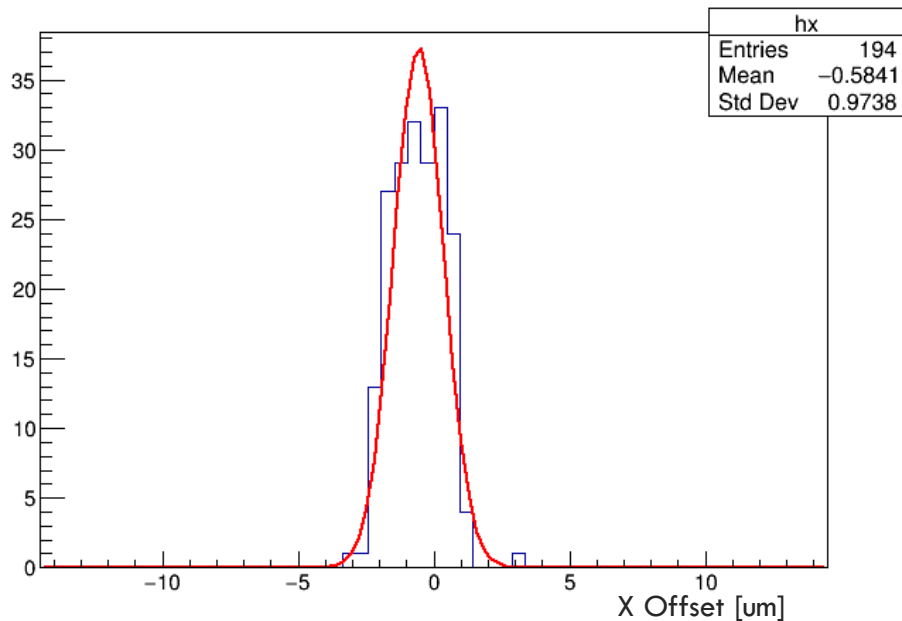


Enhance pixel recognition

PixelShop - After

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- Alignment (X,Y) offset
 - ▣ $(X,Y)_{\text{Substrate}} - (X,Y)_{\text{Chip}}$
 - ▣ ~80% more pixels

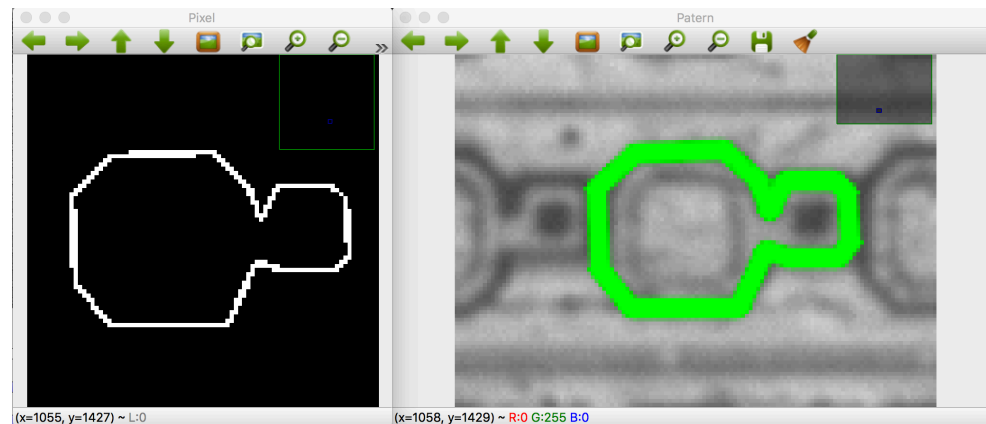


Conclusions

and next steps

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- Pixel matrix recognized
 - ▣ almost with 100% of efficiency finding pixels in the picture
- (NEXT) Automatize contrast/brightness/threshold manipulation
 - ▣ Loop over the parameters maximizing the contours found
 - Implement a region of interest (ROI) over the pixel matrix excluding other contours
- (NEXT) Manually click pixel edges to create its contour
 - ▣ Perform a template matching over the picture



Template matching

example



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