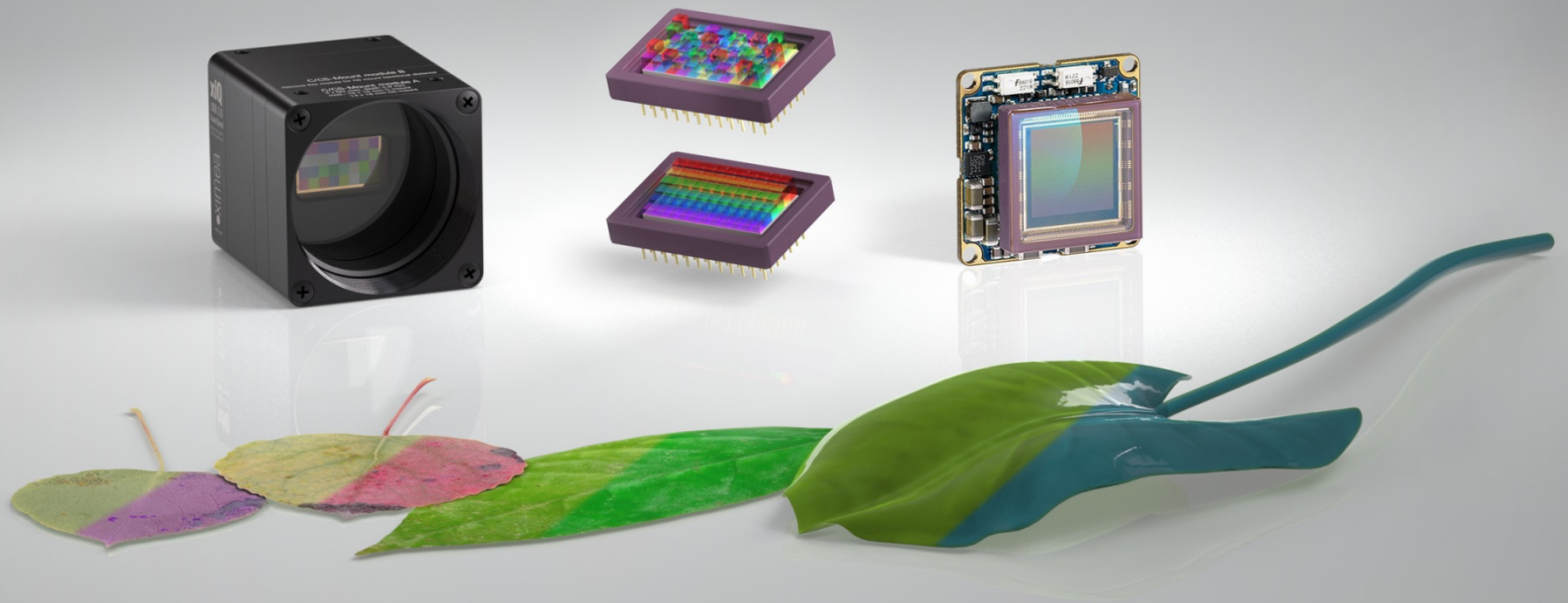


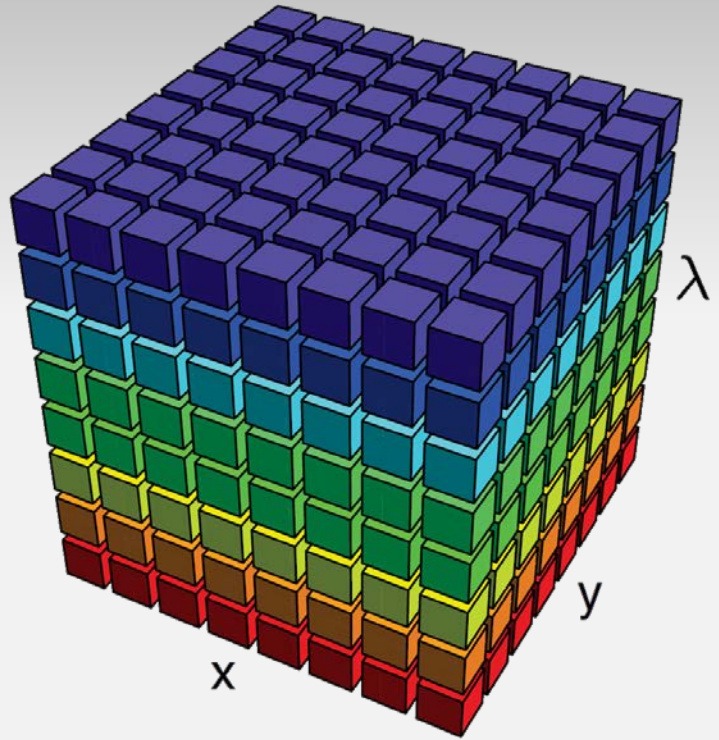
XIMEA HYPERSPECTRAL (HSI) CAMERAS

Hyperspectral Imaging (HSI)

XIMEA HSI CAMERAS

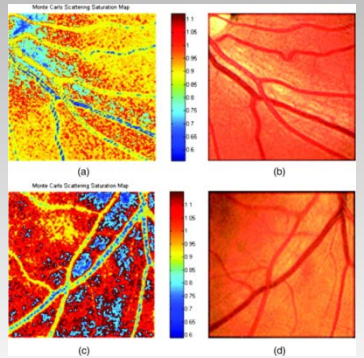
What is HSI?

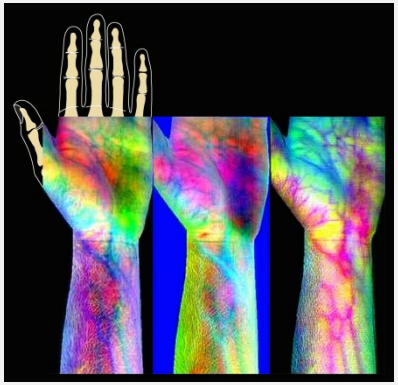
- It is combination of
  - Spectroscopy
  - Imaging
- Spectrum at each pixel
- Spectral irradiance of a scene
- Datacube I(x,y,λ)

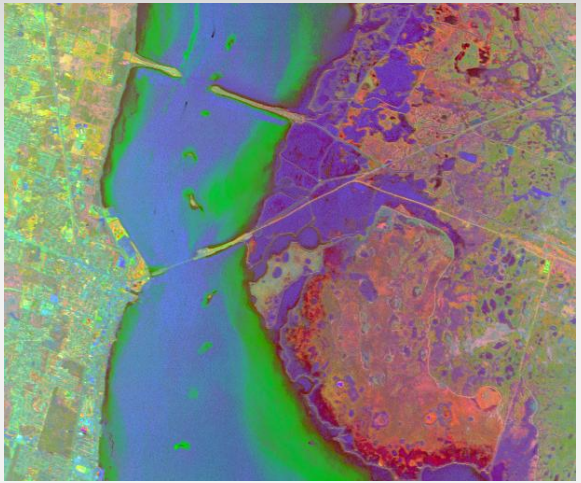


Applications

- Medical Imaging
- Life science instrumentation
- Microscopy and Endoscopy
- Precision Agriculture
- Remote Sensing
- Mineralogy
- Environmental Monitoring
- Optical sorting

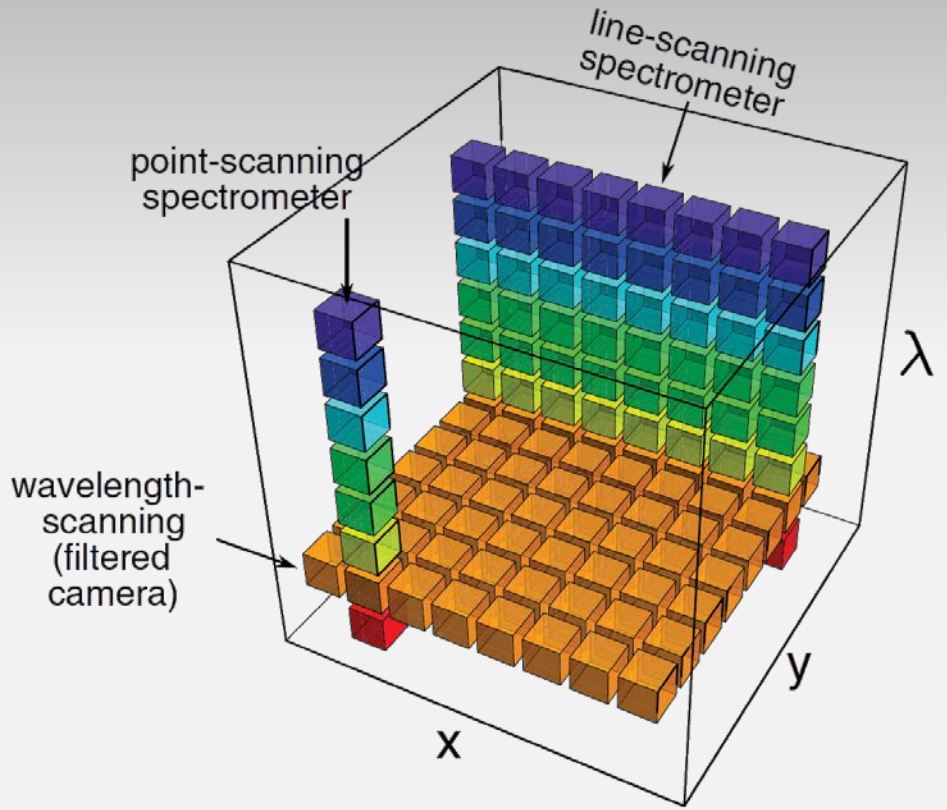






Scanning HSI tecnique

- Line scanning
- Point scanning
- Wavelength scanning

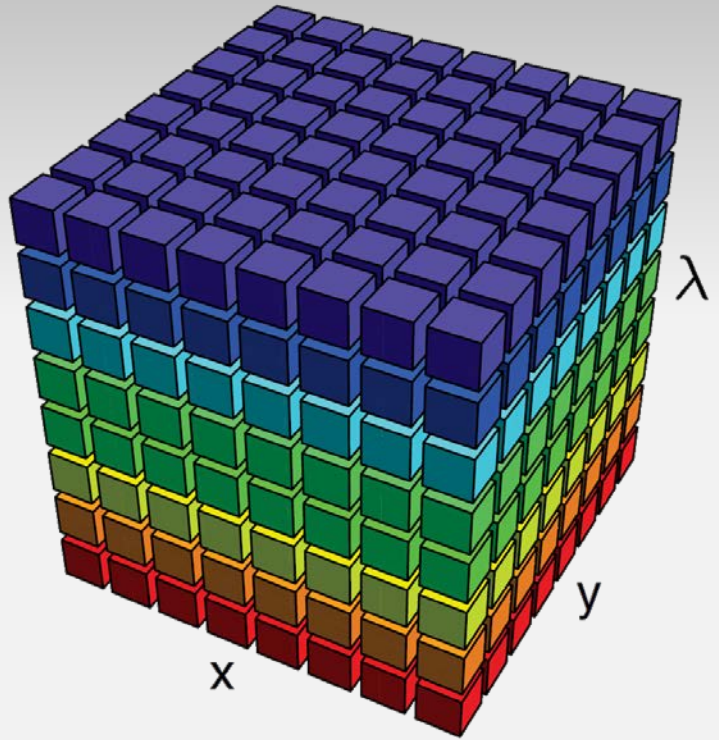


☹ Time sequential

☺ High number of bands

Snapshot HSI technique

- Split into multiple 2D elements
- Recombine with software

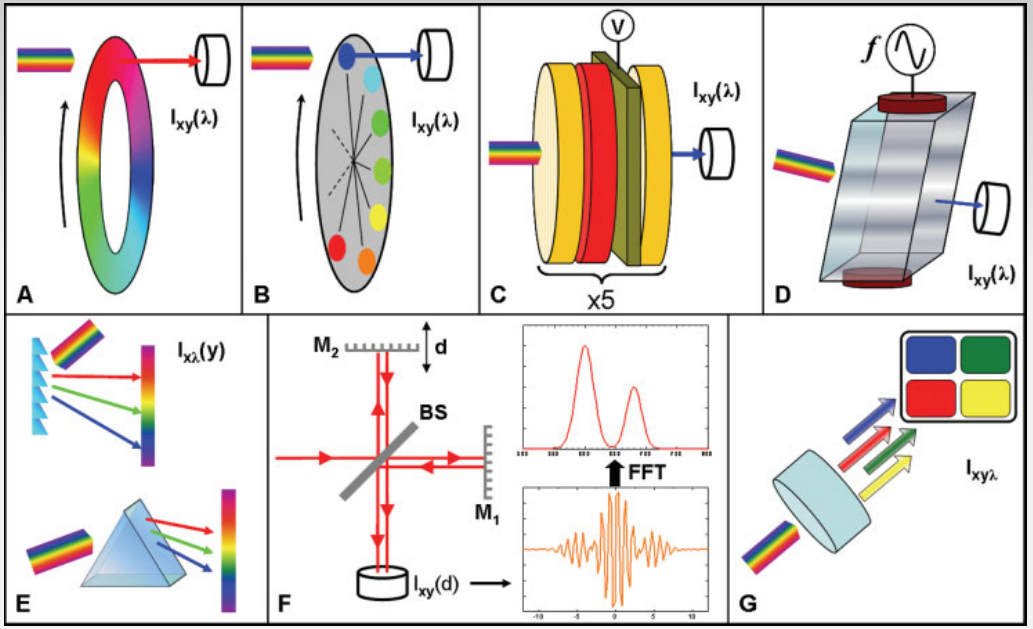


☺ Simultaneous acquisition

☹ A few spectral bands

State of the art HSI methods

- 4 basic methods
  - Wavelength scan (A..D)
  - Spatial scan (E)
  - Time scan (F)
  - “Compromise” (G)

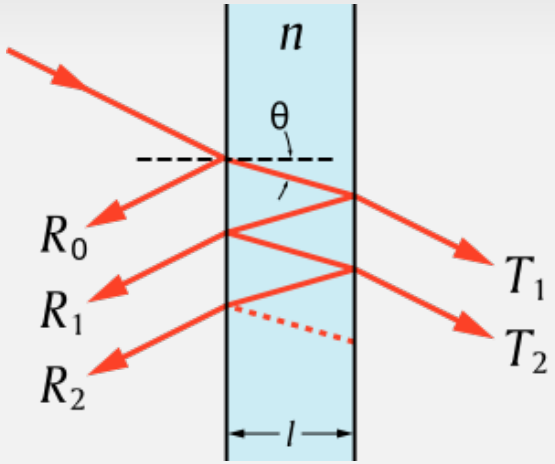


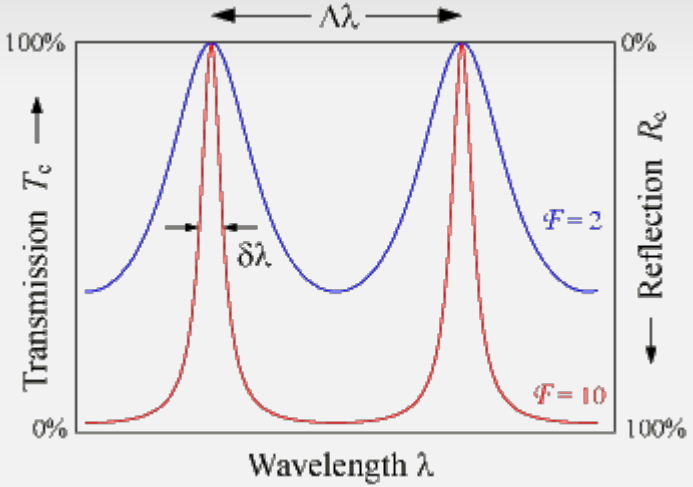
Major obstacles for massive deployment of HSI

- State of the art HSI systems are:
  - Handicraft manufactured
  - Fragile
  - Price
  - Bulky
  - Non customizable
  - Slow

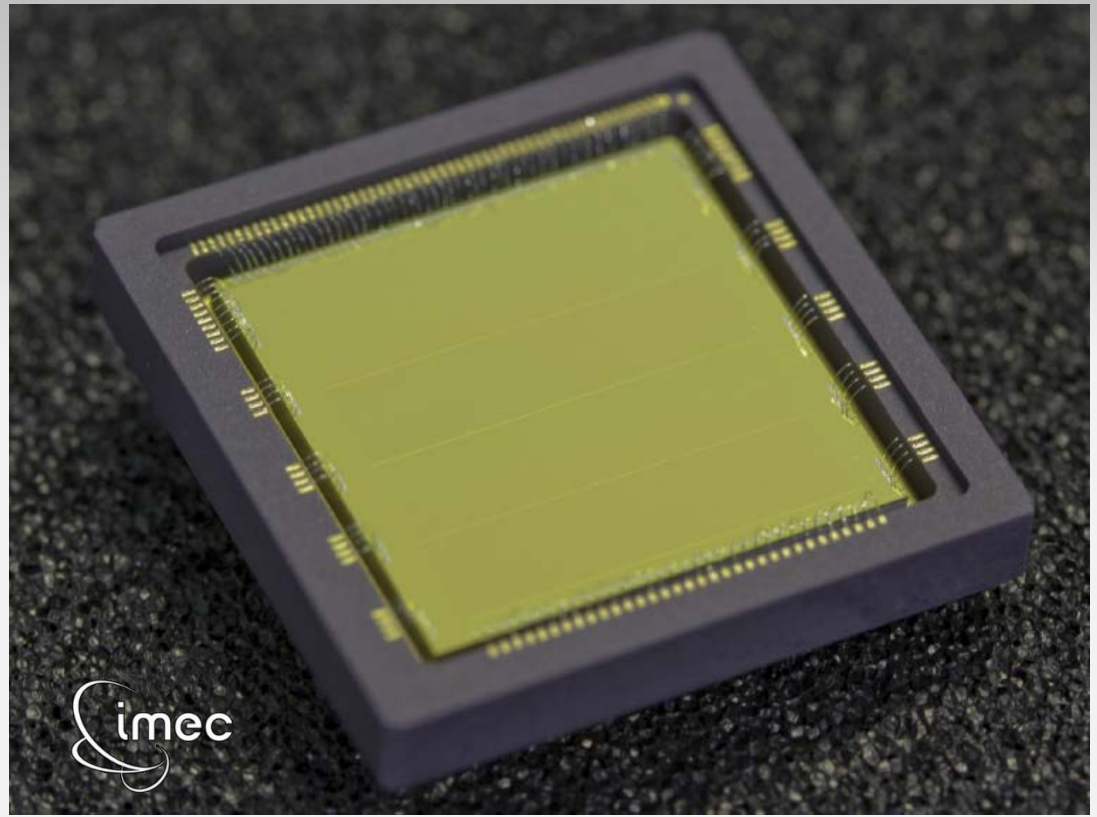
Revolutionary approach – make bandbass filters right on the sensor

- What is needed?
- Fabry-Pérot interferometric filter on top of each pixel



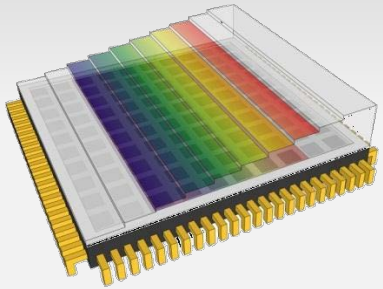


imec Hyperspectral Sensors



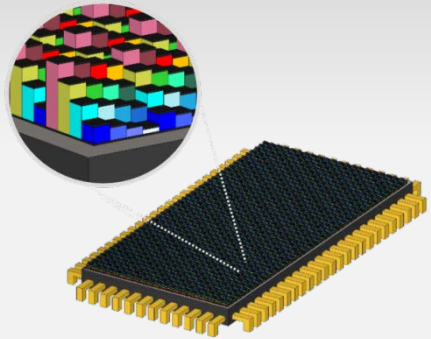
HSI sensor types, first generatoion

Linescan



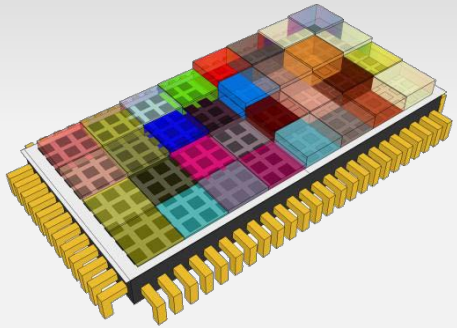
‘wedge’ design

Snapshot Mosaic



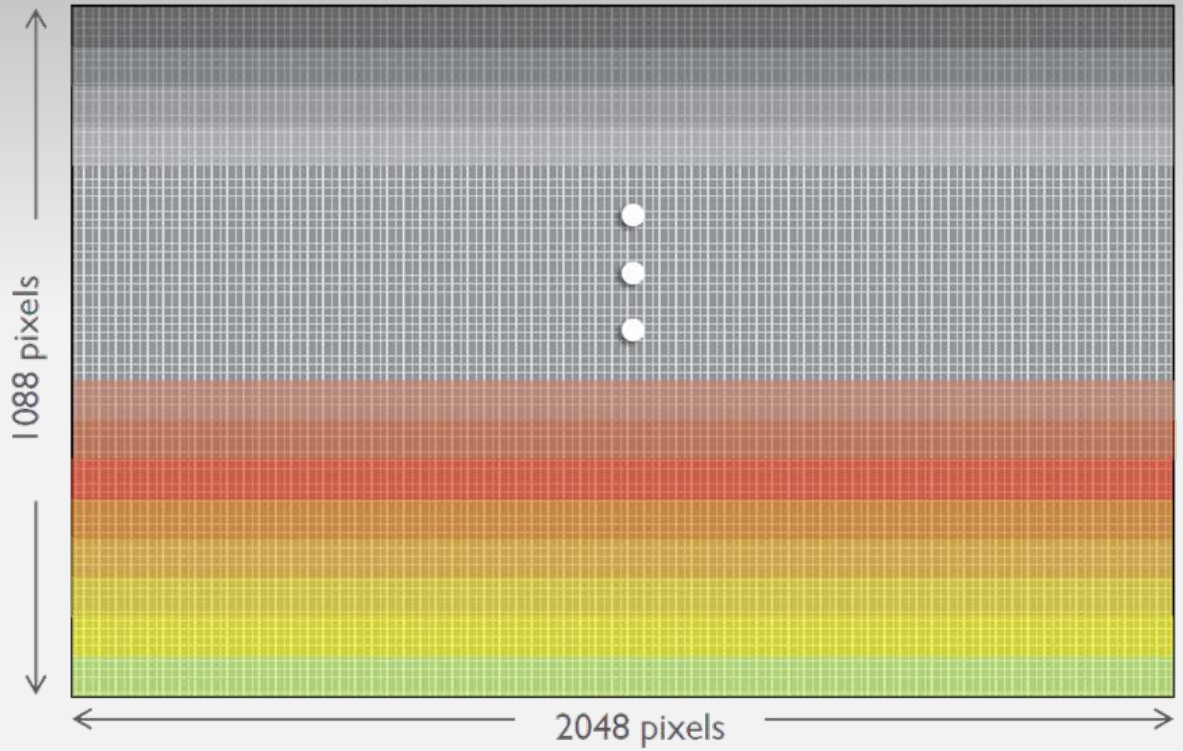
‘per-pixel’ design

Snapshot Tiled



‘area’ design

Linescan



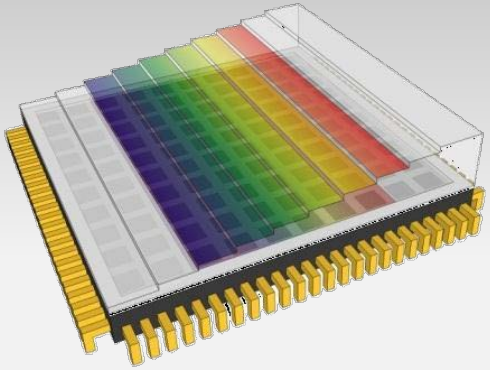
8 pixels → 1000nm
8 pixels → 996nm
8 pixels → 992nm

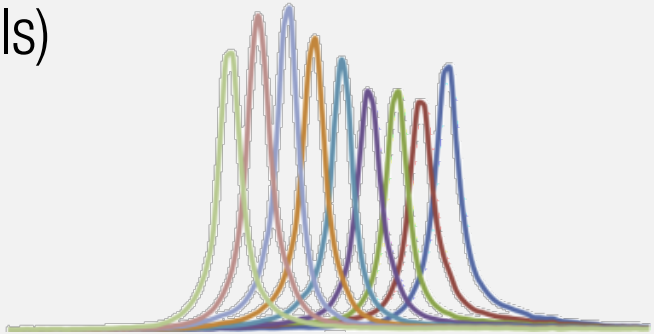
100 spectral bands
of 2048x8 spatial pixels each

8 pixels → 608nm
8 pixels → 604nm
8 pixels → 600nm

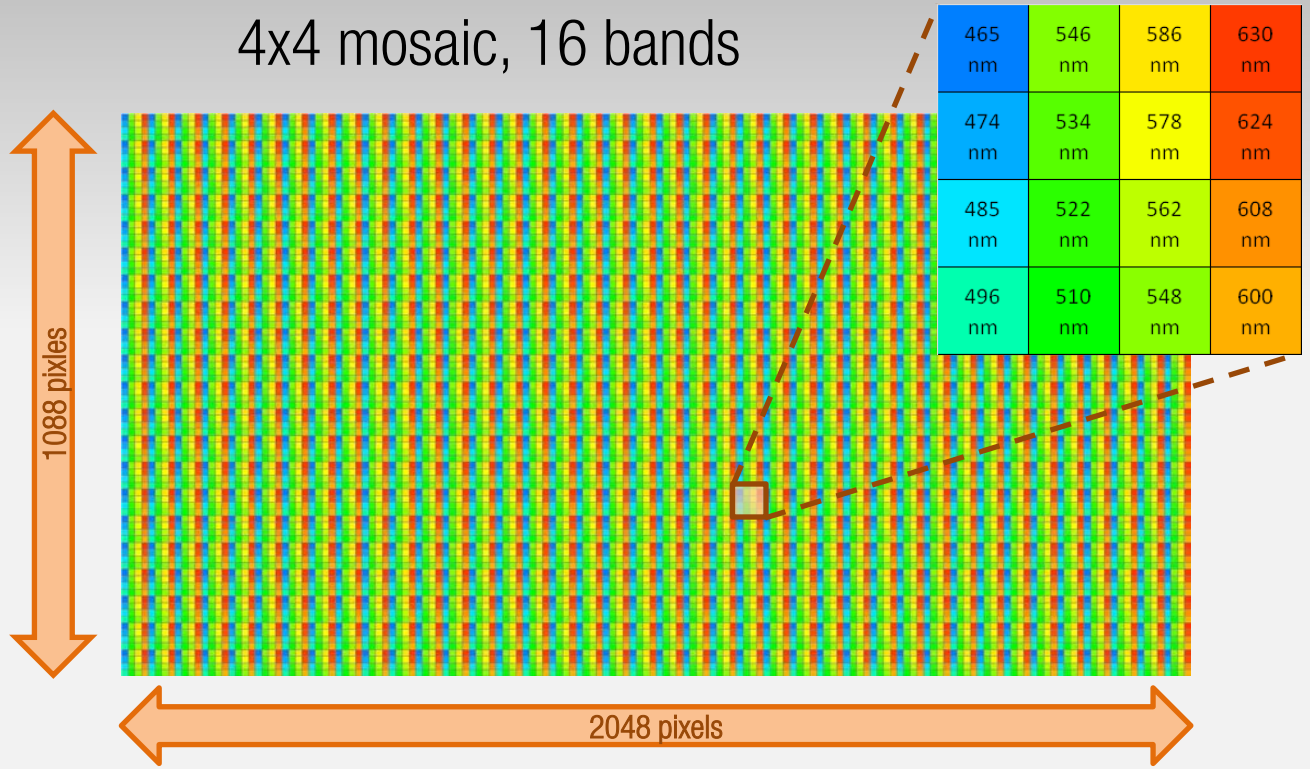
Linescan

- High resolution, fast and flexible
- 100 spectral bands
- 600-1000nm, 4nm incremental steps
- FWHM 15nm
- Spatial resolution 2048 x (100 bands x 8 pixels)
- 170 frames/sec



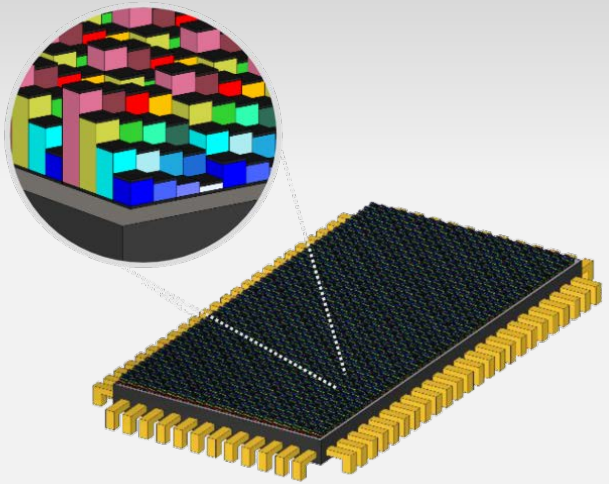


Snapshot Mosaic



Snapshot Mosaic

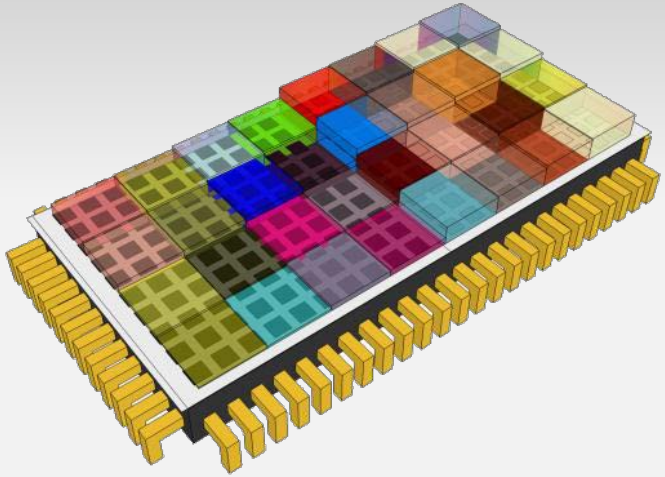
- Extremely compact, robust
- Spectral resolution: 4x4 mosaic, 16 bands
- 465-630nm, 11nm incremental steps
- FWHM 15nm
- Spatial resolution per band: 512 x 272, up to 2mpix with interpolation
- 170 data-cubes/sec



Snapshot Tiled

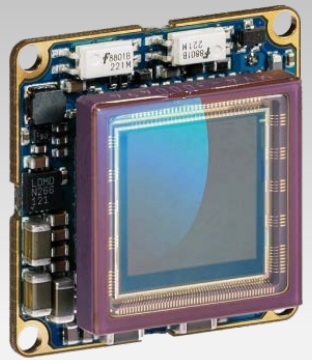
Snapshot Tiled

- User friendly, requires optical duplicator
- Spectral resolution: 32 bands
- 600-1000nm, 12nm incremental steps
- FWHM 15nm
- Spatial resolution per band: 256 x 256
- 170 data-cubes/sec



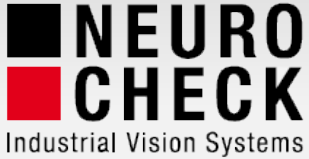
xiQ USB3 Vision camera family

- Compact: 26x26x26mm
- Low power: 1.8W
- Low weight: 27g
- Single PC board
- USB3 Vision Standard compliant



- sensors: VGA, 1.3 MP, 2 MP, 2.2 MP and 4.2 MP, b/w, color, IR extended and HSI
- frame rates: VGA @ 500 fps to 4.2 MP @ 90 fps

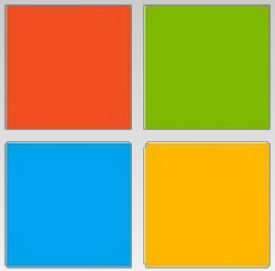
Extremely Compatible



Extremely Compatible

Support for:

- Windows
- Linux
- Mac-OS



Starter Kit content

- HSI Camera: Linescan or Mosaic or Tile
- Bandpass filter
- Lens
- USB 3.0 Host adapter and Cable 3m
- Synchronization cable 3m
- Tripod
- Case

Thank you for your attention

QUESTIONS?