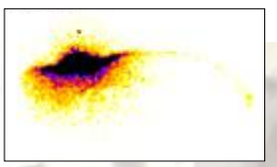
IMAGE SENSOR DESIGN & INNOVATION

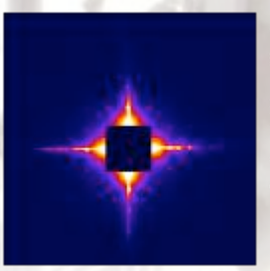
DynAMITe

– World's Largest Radiation-hard CMOS Imager

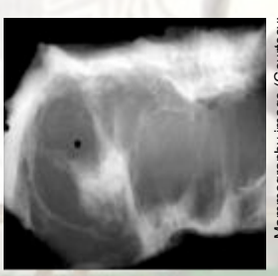
- **Fabricated in 4-metal 0.18 um CMOS stitched-technology with ~13 cm square active area (Die size = 13.11 x 13.4 cm)**
- **Dual spatial resolution – 2,560 x 2,624 pixels at 50 um pitch, and 1,280 x 1,312 pixels at 100 um pitch**
- **Four independent cameras in one physical array with full random-addressing of the array**
- **Radiation-hard array – considered "best-in-class"**
- **Two-sides buttable with die-to-die butting loss of ~75 um**
- **Frame rates up to 15 fps (7 outputs): 30 fps (14 outputs) for 50 um pixels; 45 fps (7 outputs): 90 fps (14 outputs) for 100 um pixels**
- **Fully programmable multiple regions of interest – 375 fps for 100 rows at 50 um (7 outputs)**
- **Multiple readout options including non-destructive and full CDS**
- **Full industry-standard electrostatic protection**
- **Built-in redundancy to enhance yield**
- **Low-power consumption ~ 1W at 3.3 V**



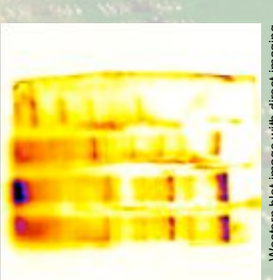
14C autoradiograph of skin section
(Courtesy: Michela Esposito, Uni of Surrey)



Small-cystal X-ray diffraction
(Courtesy: Ian Robinson, UCL)

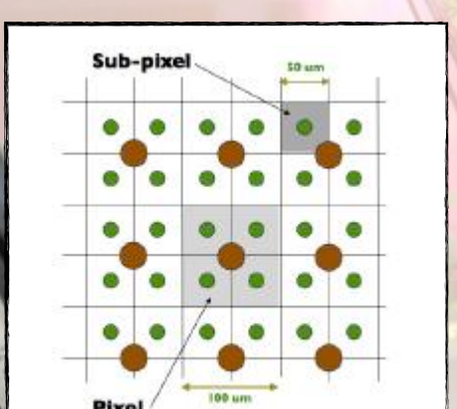


Mammography image (Courtesy:
Tasos Konstantinidis, UCL)

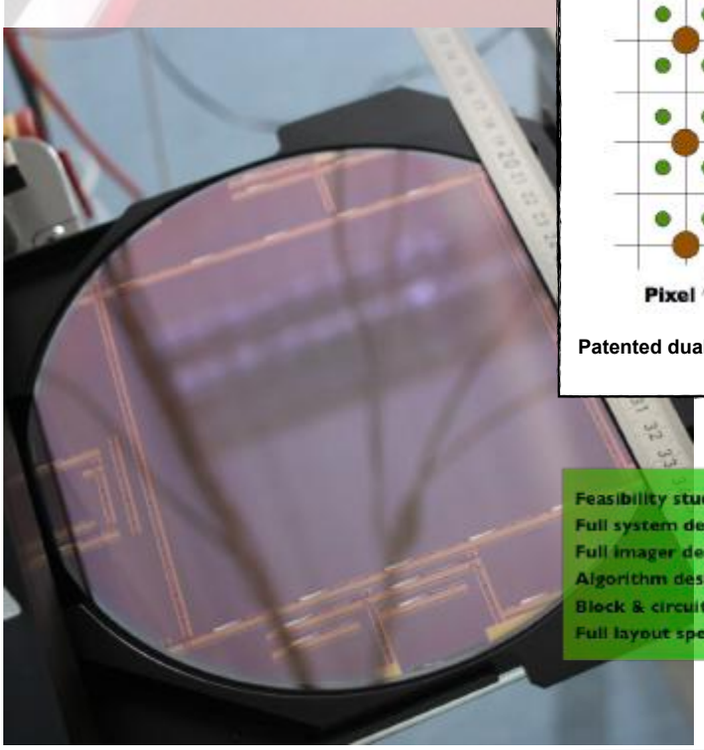


Western blot image with direct imaging
~1 s exposure (Courtesy: Michela
Esposito, Uni of Surrey)

Phantom image of 37 MeV protons
(Courtesy: Phil Evans, ICR)



Patented dual resolution pixel architecture



Feasibility studies
Full system design
Full imager design
Algorithm design
Block & circuit diagrams
Full layout specification

Tape out
Mask production
Wafer processing
Wafer probing
Dicing and packaging

Electronics & S/W design
Systems supply
Supply chain mgmt.
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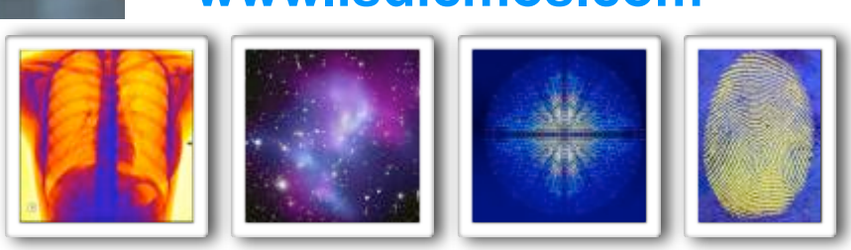
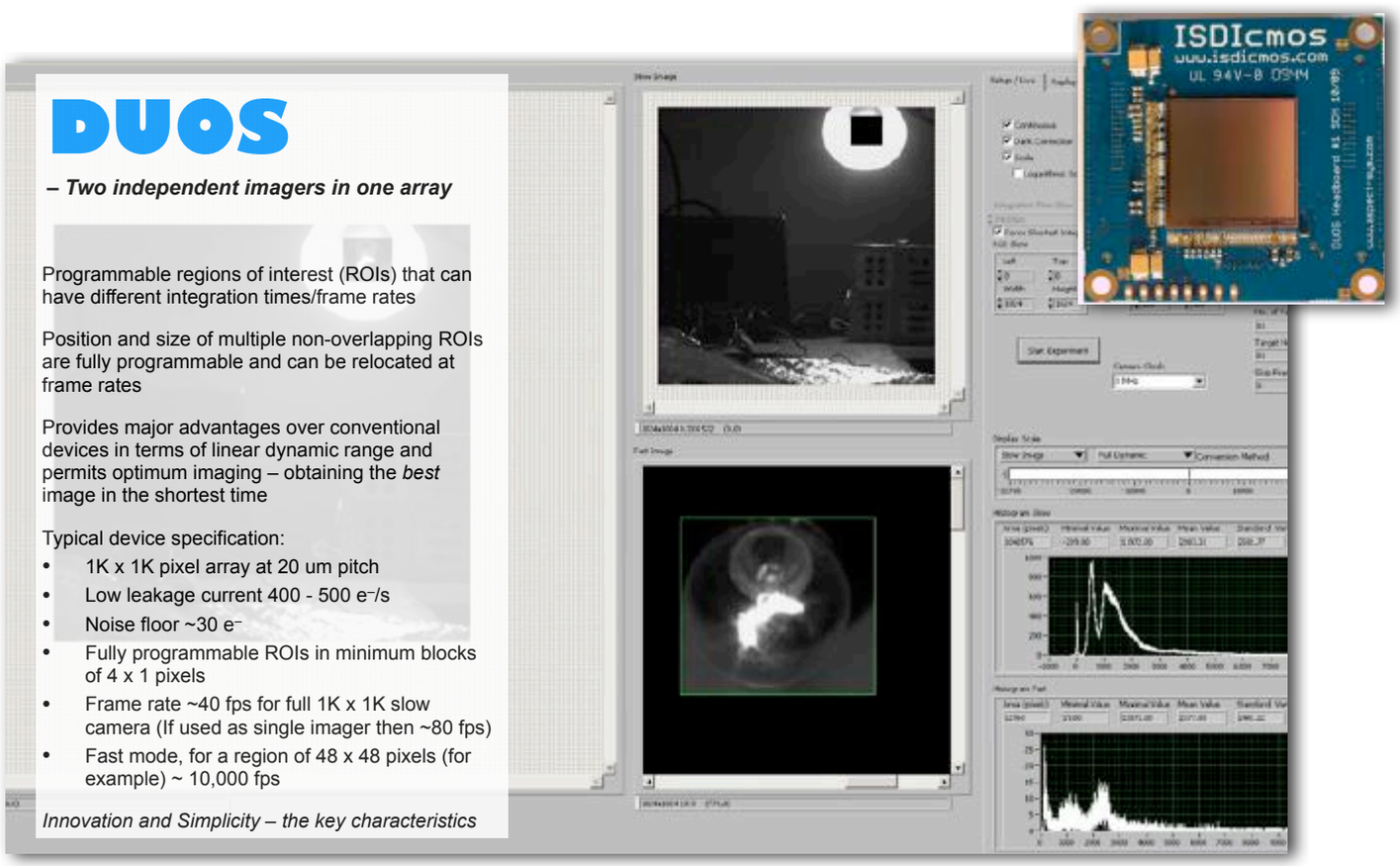


IMAGE SENSOR DESIGN & INNOVATION

- **Full design capability from top-level user requirements to tested sensor delivery**
- **Over 60 years accumulated experience in CMOS imaging devices**
- **Full industry CAD tools and processes**
- **Excellent relationships with Silicon Foundries**
- **Detailed device modelling and post-fab capabilities**
- **Supply of complete imaging systems**

ISDI (Image Sensor Design and Innovation) Ltd provides imaging solutions for cutting-edge medical, scientific and other technological application domains through re-thinking the entire imaging acquisition process. With many of **ISDI**'s core team having wide-ranging involvement in delivering some of the World's most complex imaging systems, we understand more about the theory and practice of imaging - from charged particles to the infra-red - then other imaging companies. At the heart of **ISDI**'s capability is the specification, design and implementation of custom imaging sensors to meet optimally the customer's distinct imaging needs. **ISDI**, through an extensive network of consultants, academics and industry specialists, has access to world-class expertise and facilities.

The latest ISDI achievement in novel imaging technologies is a true two resolution imager on the same die and extremely high dynamic range linear pixel, capable of delivering very large well capacities (>5M e^-) and very low noise (<80 e^-).



DUOS

– Two independent imagers in one array

Programmable regions of interest (ROIs) that can have different integration times/frame rates

Position and size of multiple non-overlapping ROIs are fully programmable and can be relocated at frame rates

Provides major advantages over conventional devices in terms of linear dynamic range and permits optimum imaging – obtaining the *best* image in the shortest time

Typical device specification:

- 1K x 1K pixel array at 20 um pitch
- Low leakage current 400 - 500 e^-/s
- Noise floor ~30 e^-
- Fully programmable ROIs in minimum blocks of 4 x 1 pixels
- Frame rate ~40 fps for full 1K x 1K slow camera (If used as single imager then ~80 fps)
- Fast mode, for a region of 48 x 48 pixels (for example) ~ 10,000 fps

Innovation and Simplicity – the key characteristics

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