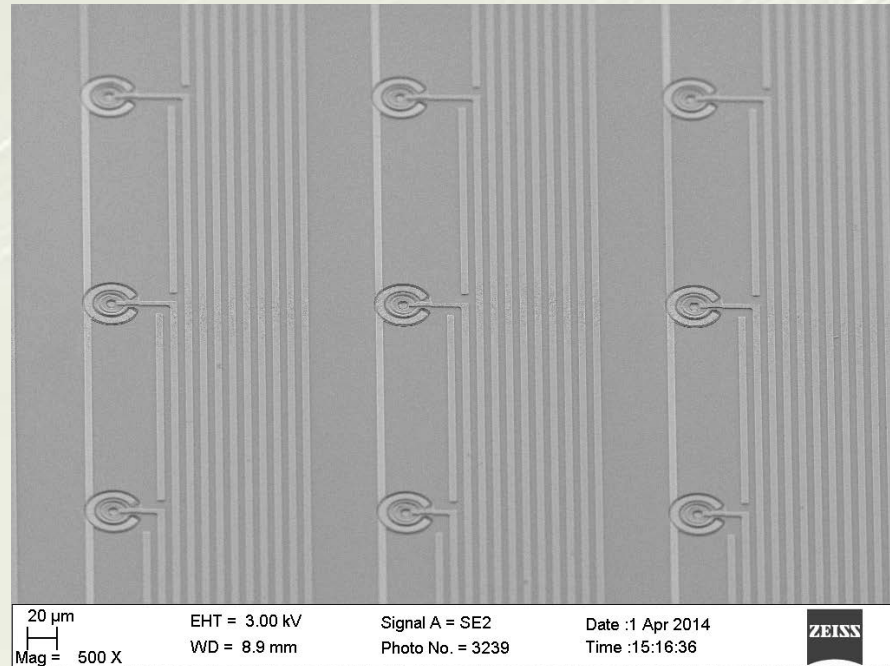


Silicon Microdosimeters



OVERVIEW

Silicon microdosimeters are **silicon-based radiation sensors for experimental microdosimetry** in hadron therapy or in unknown mixed radiation fields typical of space and aviation.

The microdosimeters are formed by a **matrix of independent unit cells** (microsensors) with a **well-defined micrometric cylindrical shape** and a 3D sensitive volume similar to those of cellular structures. They are fabricated with an **innovative 3D silicon microfabrication technology** for radiation detectors.

These devices **overcome the shortcomings of the conventional Tissue Equivalent Proportional Counters**.

FEATURES

- Well-defined micrometric sensitive volumes for accurate microdosimetric measurements with excellent spatial resolution.
- No contributions of wall effects to the measured spectra.
- Low operating voltage (<5V).
- Light and easily portable.
- Low dead times and fast response.
- Pixellated design to provide 2D measurements.
- Can be read out with the portable ALIVATA System.

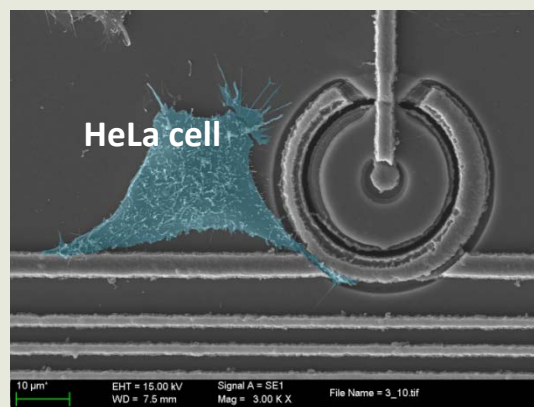
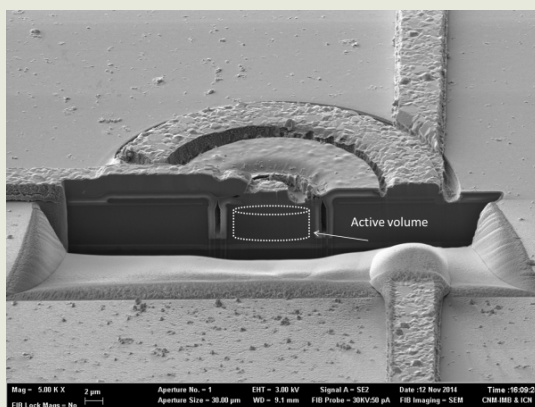
This product is fabricated by the Spanish National Research Council (CSIC) and sold under license

Silicon Microdosimeters

“Cell-like” sensitive areas

In order to provide **accurate microdosimetric measurements**, the active volume of the microsensors has micrometric **dimensions in the range of the size of human cells**.

(Images: SEM pictures of the section of a microdosimeter where the sensitive volume is marked with a white cylinder, and of a HeLa cell (blue) next to a microdosimeter for size comparison. C. Fleta et al., JINST 10, P10001 (2015))

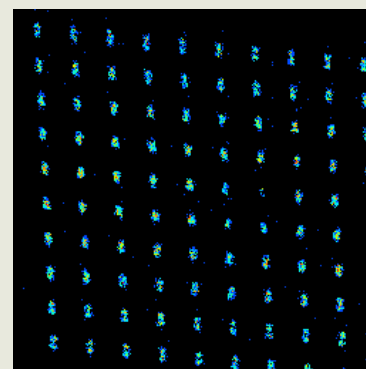
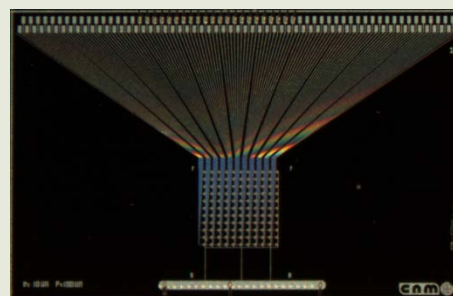


Pixellated sensors

The silicon microdosimeters are arranged in a pixellated design to provide an **x-y map** of the microdosimetric measurements.

The pixellated sensor is an **array of active and well defined unit cells**. Each sensitive region acts as an independent active site.

(Images: Top view of a microdosimeter array and IBIC efficiency map of a 10x10 unit cells sensor (2 mm x 2 mm area) at 5 V bias. C. Fleta et al., JINST 10, P10001 (2015))



Accurate microdosimetric measurements

The silicon microdosimeters can provide accurate measurements of microdosimetric quantities with **unprecedented spatial and dose resolution**.

(Image: Microdosimetric spectrum of lineal energy, $yd(y)$, obtained with an array of microdosensors and a ^{241}Am alpha source. C. Guardiola et al., Appl. Phys. Lett. 107, 023505 (2015))

