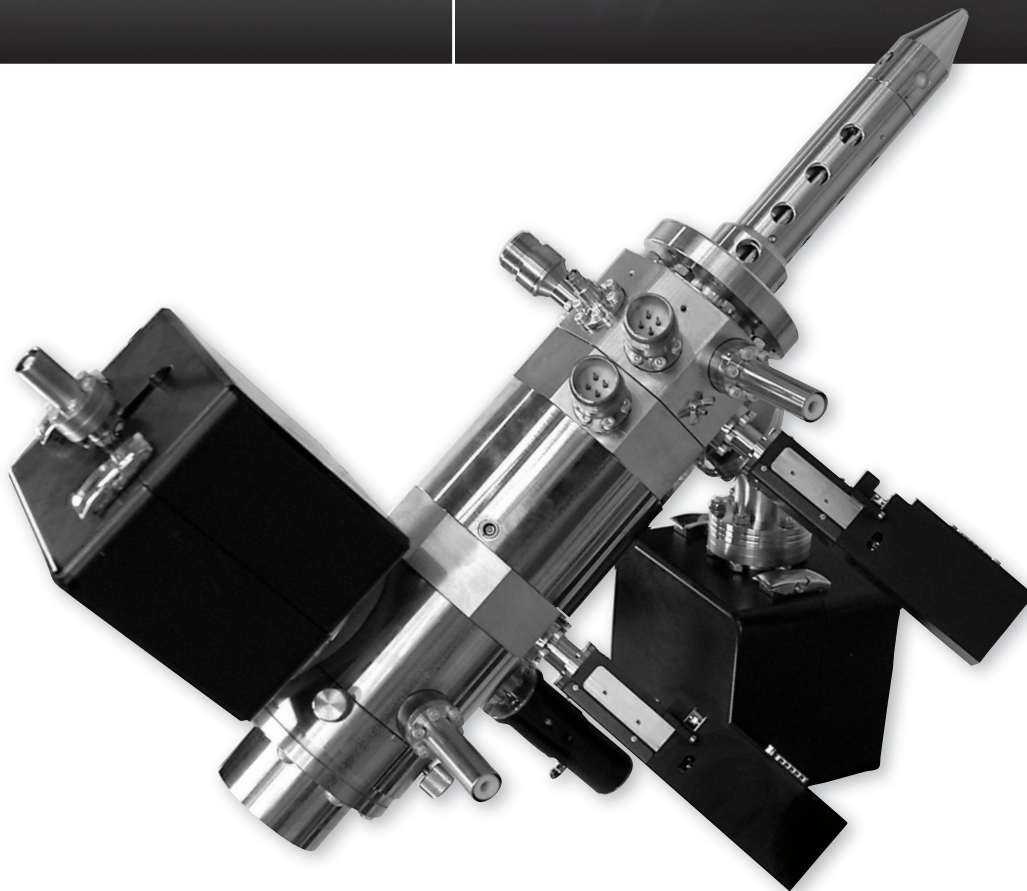
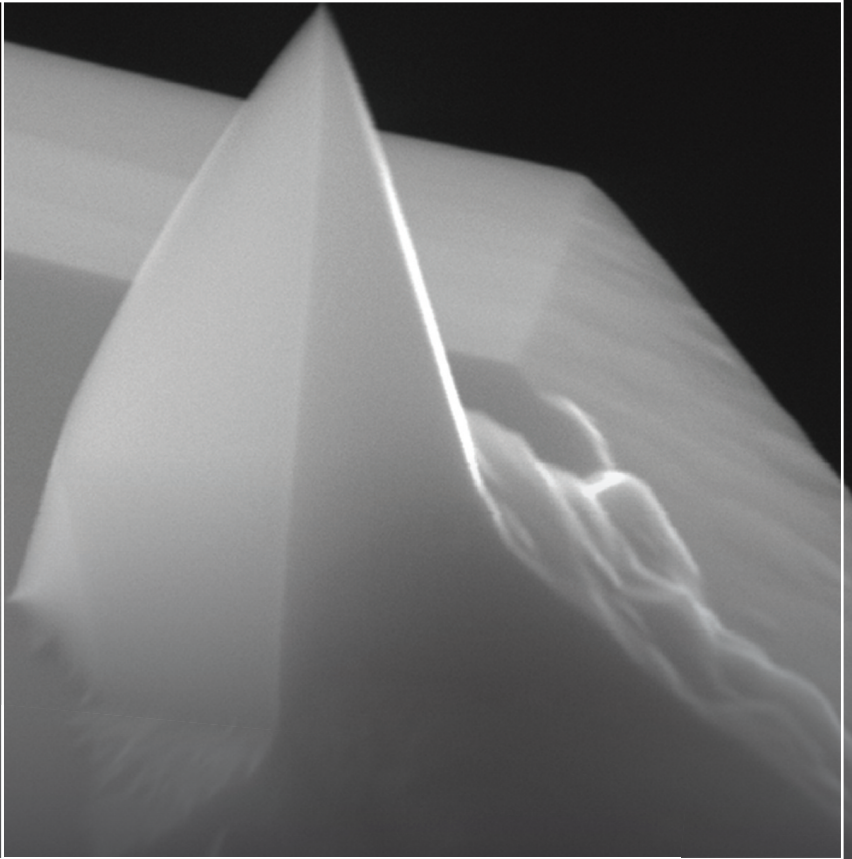


Cobra ExB

High resolution
Ga-free FIB column



UHV
Compatible

Cobra ExB

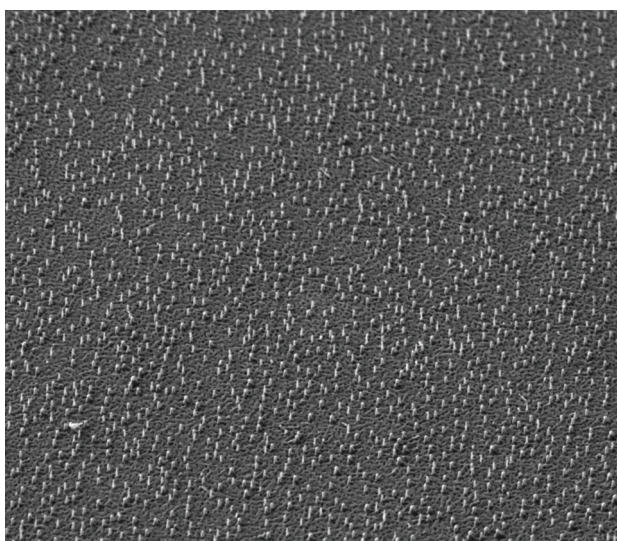
High resolution
Ga-free FIB column

Key Features

Source	LMAIS (Liquid Metal Alloy Ion Source) of AuGe / AuSi / Bi / Ga
Ion Species	Au ⁺ , Au ⁺⁺ , Au ₃ ⁺ , Ge ⁺ , Si ⁺ , Si ⁺⁺ , Gold clusters (Au _n ^{q+} with n/q up to 100), Bi ⁺ , Bi ⁺⁺ , ...
Energy Range	1 - 30 keV
Probe Current	1 pA - 20 nA
Characteristics	Low aberration and high mass resolution ExB Wien Filter with 12 movable acceptance apertures ($M/\Delta M > 45$)
Miscellaneous	Alternative LMAIS can be available upon request

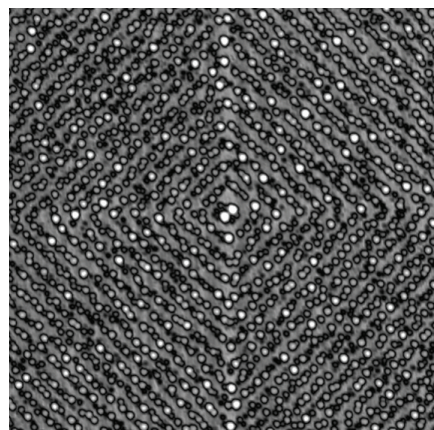
Ion Beam Guaranteed Performances at 30 keV with Ga⁺/ WD = 12 mm

Beam Current	1 pA	10 pA	50 pA
Ultimate Resolution	5 nm	15 nm	30 nm



Nanowires vertical growth with gold droplets as catalysis
(FOV = 83 μ m)

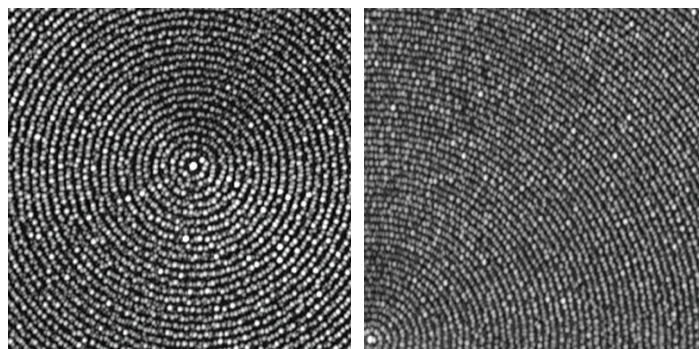
Cobra ExB is a specific FIB column providing a performing **alternative** to the well-known Cobra FIB (gallium source). Thanks to the alliance of a **LMAIS** (Liquid Metal Alloy Ion Source) and a **Wien Filter**, Cobra ExB offers an easy solution for ion mass selection from light species to heavy clusters with great resolution imaging. This **Ga-free FIB** Column achieves precise milling and accurate selective surface implantation with a large panel of ion species.



Self-organization of Ge nanocrystals (50nm)
by FIB dewetting using Cobra ExB

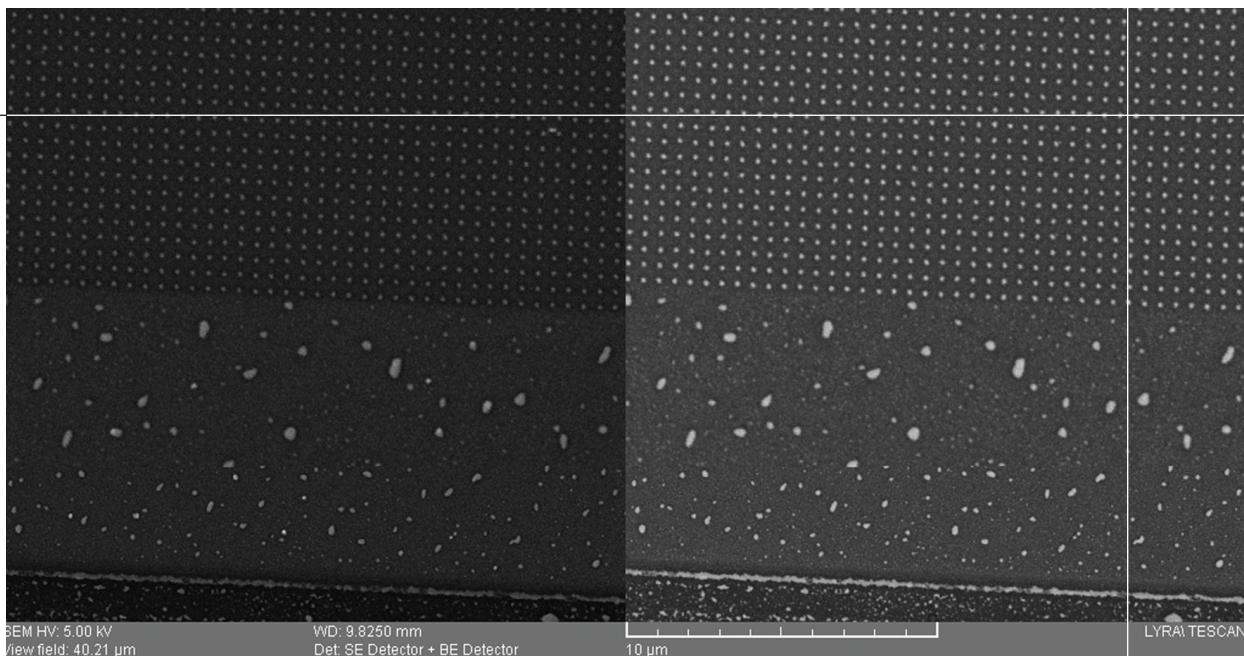


AFM image of Au nanocatalyst by FIB local
implantation (50 nm spot size) using Cobra ExB



AFM images of self-organized ultra-small Ge NCs (Nano-Crystals) (50 nm large)
into 2D periodic arrays of circles using heterogeneous dewetting
of Cobra ExB FIB patterned 5 nm thick

Special thanks to I. Berbezier for all Cobra ExB images on this technical sheet (CNRS IM2NP, Marseille France)

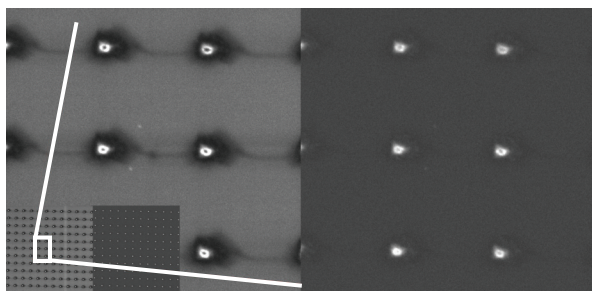


Images of dewetted areas after FIB patterning using COBRA ExB and TESCAN LYRA1 SEM

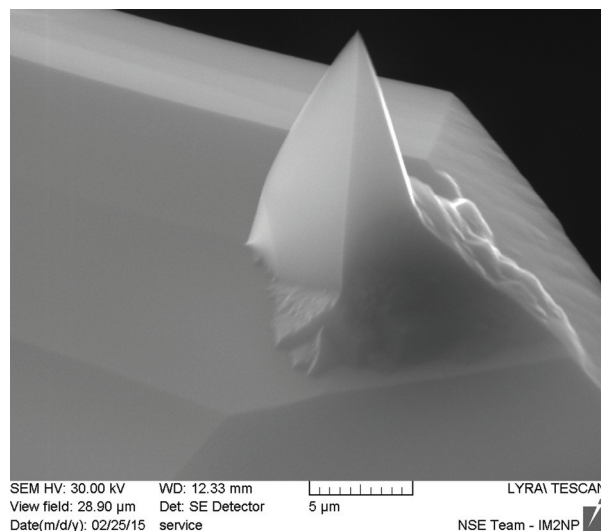
Description

Cobra ExB is based on the highly proved performances of our Cobra Ga FIB and guarantees **high resolution with Ga-free source**. This FIB column offers a **great variety of ion beam species for both milling and local implantation** which extends significantly its fields of applications.

The **low aberration Wien Filter** developed by Orsay Physics allows a **precise mass selection of ion species according to their mass to charge ratio** (m/q) thanks to adjustable electric and magnetic fields (ExB). Therefore the selected particle trajectory remains straight and passes through an aperture while the others are deflected. A **set of 12 movable apertures** is added at the end of the Wien filter for exact and high resolution mass selection.



Gold droplets organization thanks to FIB nanopatterning (FOV = 30 µm)



Observation of an AFM tip ($\times 5000$) using Cobra ExB and TESCAN LYRA1 SEM

Beside the standard AuSi and AuGe sources, Orsay Physics develops **customized metallic alloy** solutions upon requests such as sources based on Si, Cr, Fe, Co, Ni, In, Sn, Mn, Pb,...

Cobra ExB is easily adaptable on any vacuum chambers as it is also **available in a UHV configuration** and so bakeable up to 120°C.

Main characteristics

- Mechanically-controlled 2-axis XY and tilt motion for source alignment
- LMAIS inserted in a cartridge for easy and fast refill and maintenance
- Pneumatic valve isolating the gun from the bottom part of the column for easy replacement and maintenance of the source
- 12 movable apertures after the condenser lens for beam current adjustment
- Wien Filter with a set of 12 movable mass apertures for ion species precise selection
- Fully integrated electrostatic beam blanker and Faraday Cup for precise current measurements

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