

# GEMINI® HC/DoF Module

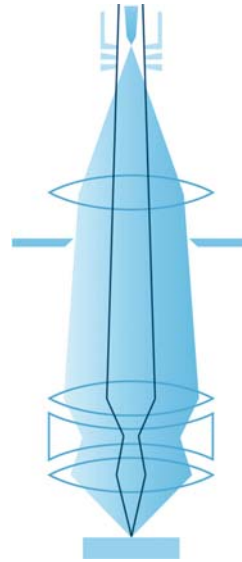
## Introduction

The unique High Current / Depth of Field (HC/DoF) module has been recently introduced for the new SUPRA® and ULTRA field emission SEMs with GEMINI® column. The HC/DoF module doubles the specified beam current from the standard 10 to 20 nA. The higher beam currents now achievable with the GEMINI® column are especially beneficial for analytical applications. Beam currents up to 50 nA are possible, but are dependent on the individual filament geometry and can not be guaranteed.

The HC/DoF module consists of a package of firmware and hardware to enhance the condenser operation and can be controlled by a simple mouse click. When the HC/DoF module is switched on, the beam current will be doubled. The actual beam current depends on the aperture used. On the previous 1500 series GEMINI® systems the condenser control is used to optimise the beam current and aperture angle for the 30 µm aperture only. The new HC/DoF module controls the upper condenser to enable aperture angle optimisation on all apertures. The resolution on the larger apertures (60 and 120 µm) is dramatically improved and image rotation is automatically compensated. Another important advantage of the HC/DoF module is the remarkable improvement of the depth of field. The new technology aperture angle control produces clear fully focussed images of high tilted specimens even at low working distances without the use of dynamic focus. This is particularly useful for topographic samples (see Fig. 1 and Fig. 2).

## Benefits of the HC/DoF Module

- Double beam current compared to standard condenser control: 20 nA specified
- Improved depth of field
- Smaller aperture angle
- Higher resolution on larger apertures (60 and 120 µm)



The improved depth of field, with the virtual parallel illumination, is also very beneficial for EBSD specimens at 70° tilt. The complete specimen area remains in focus without the need for dynamic focus (Fig. 3). Fig. 4 shows the distortion-free image with tilt correction applied. The SUPRA® series now offers the best available platform for EBSD analysis with high current, extended depth of field, distortion-free imaging, purpose designed chamber geometry and eucentric stages.

## Upgrade path

The HC/DoF module can be upgraded on GEMINI® SUPRA® FE-SEM and 1500 uniplinth FE-SEM series instruments, but not on the SUPRA® 25 or 1525 instruments, since these instruments do not have a condenser implemented in the GEMINI® column.

The HC/DoF module is standard on the SUPRA® 50/50VP which aims at analytical applications.



We make it visible.

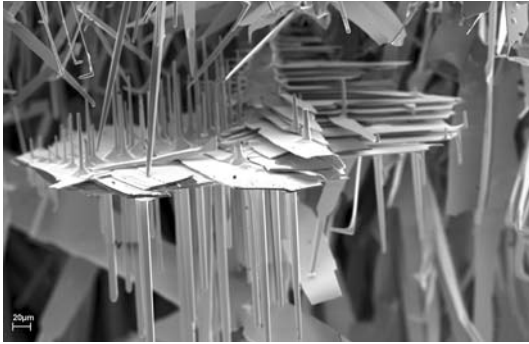


Fig. 1: Normal imaging on high topography sample. The sample is 4 mm high and was acquired at 4 mm working distance and 1.2 kV. Although the GEMINI® column is still superior to other systems.

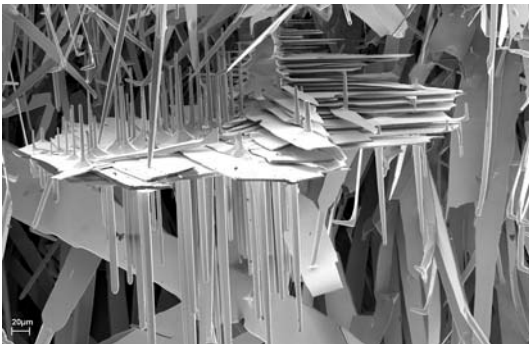


Fig. 2: Using the HC/DoF module gives a dramatic improvement of the depth of field under the same conditions as in Fig. 1. Even with a height of 4 mm the complete sample is in focus.

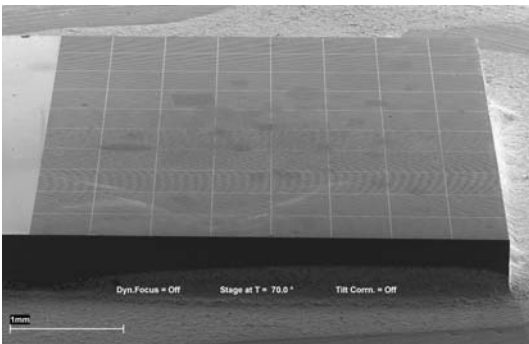


Fig. 3: High depth of field produced by the HC/DoF module. Tilt correction is off.

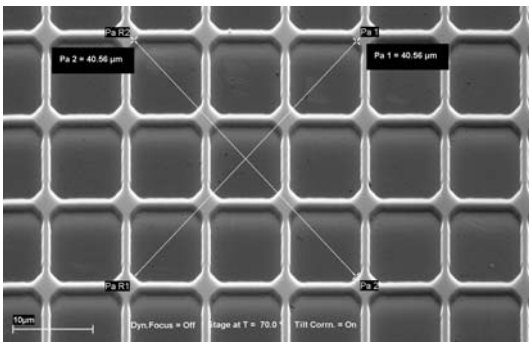


Fig. 4: Undistorted geometry at 70° tilt and with tilt correction on. NOTE: Dynamic focus was not used!

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