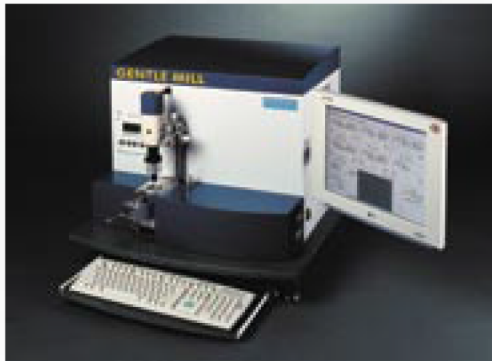


# GentleMill™ (IV5)



## LOW-ENERGY ION SOURCE (ONE FIXED TYPE)

- variable, continuously adjustable ion energy (100–2000 eV)
- variable, continuously adjustable ion current (7–90  $\mu$ A)

## VACUUM SYSTEM

- original Pfeiffer computer-controlled vacuum system with oil-free membrane and turbomolecular pumps, equipped with compact full-range vacuum gauge (combined Pirani and Penning heads)
- vacuum load-lock system

## SPECIMEN ADJUSTMENT

- electronically adjustable milling angle from 0° to 40° (in 0.1° increments)
- computer-controlled specimen rotation and oscillation from 0° to 120° (in 10° increments)
- remarkable thickness range of accepted TEM samples (30–200  $\mu$ m)

## COMPUTER CONTROL

- built-in personal computer
- easy-to-use graphical interface
- highly automated operating regime for minimal user intervention
- milling and polishing cycles can be pre-programmed or manually set
- all important parameters can be easily changed by mouse clicking
- on-line service for error detection and problem elimination
- CCD camera image for real-time visual control (up to 400 $\times$  magnification)

## SIZE / WEIGHT

### MiniMill™

- width: 520 mm, height: 620 mm, depth: 680 mm
- weight: ca. 50 kg

### GentleMill™

- width: 700 mm, height: 600 mm, depth: 670 mm
- weight: ca. 50 kg

## POWER REQUIREMENTS

- 100-120 V / 3.0 A / 60 Hz or 220-240V / 1.5 A / 50 Hz
- single phase

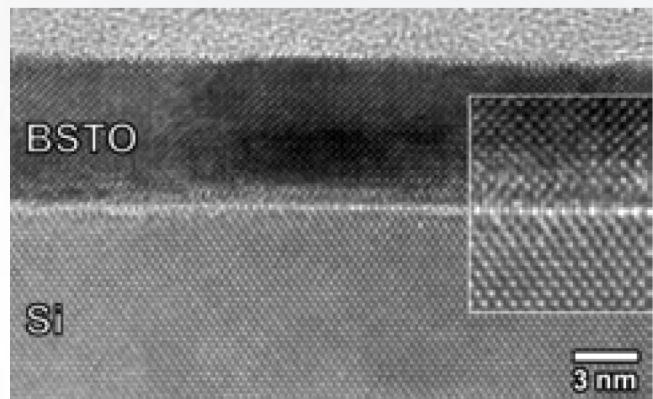


Figure 1. HRTEM image of perovskite/Si interface in a multilayer semiconductor system treated with GentleMill™.

Image from Norga et al.: Growth of perovskites with crystalline interfaces on Si(100). IBM Research Lab, Switzerland.

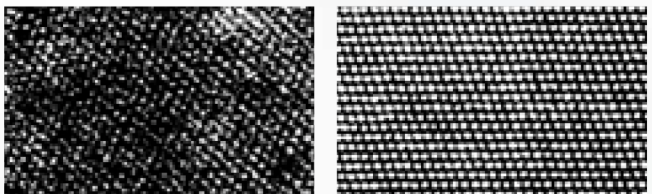


Figure 2. HRTEM images obtained by a Philips CM20 electron microscope of [011] GaAs samples thinned by Ar<sup>+</sup> ion milling (left) at 3000 eV (right) and 200 eV using the GentleMill™.

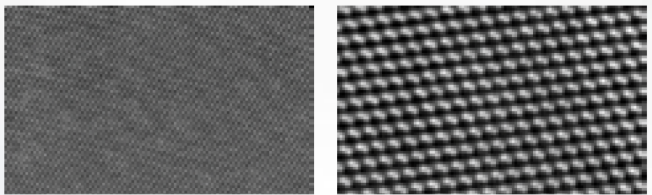


Figure 3. Dumbbells in Si [110] observed at Berkeley Lab, CA, USA with a Philips CM 300 FEG electron microscope. Sample was thinned by Ar<sup>+</sup> ion milling using GentleMill™ at 200 eV and 3 degrees of beam incidence, (left) low-magnification HRTEM image, (right) high-magnification HRTEM image.

Images by courtesy of C. Kisielowski, C. Nelson, National Center for Electron Microscopy, Lawrence Berkeley Laboratories, 1999.

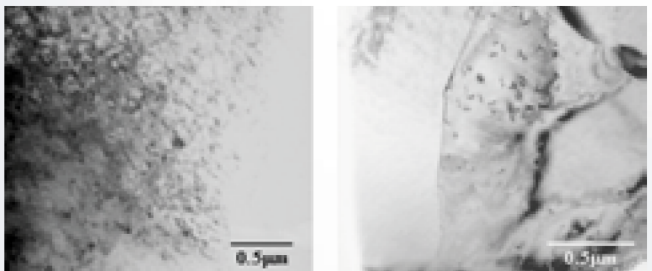


Figure 4. HSLA steel TEM specimen (left) before low keV milling and (right) after low keV milling in GentleMill™.

C.L. Collins et al.: Reducing ion damage in FIB-prepared HSLA steel TEM specimens using a low energy ion milling system. Presented at the EMC 2004.