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DATASHEET

µPolisher

Low energy ion polishing solution for localized surface cleaning

The Thermo Scientific™ µPolisher system is a unique solution for *in situ*, very low energy, local surface modification, including polishing and cleaning of bulk samples. Typical interaction types range from chemical reaction to reactive ion etching and ion milling, depending on the energy.

The system uses static beam of gaseous Ar^+ ions with adjustable energies from 20 to 500 eV to ensure gentle surface polishing. Independent of energy, it offers a wide range of ion currents from 0.01 to 100 nA, enabling a large variety of applications. In addition to this, the µPolisher system offers a number of unique performance capabilities, such as high current density for fast surface cleaning and localized beam to ensure precise site-specific treatment without re-deposition from surrounding sample objects. It is fully embedded in the SEM/DualBeam™ system allowing for immediate viewing or experimentation after cleaning, without the need to break the vacuum. Being fully integrated in the microscope user interface software, the µPolisher system provides easy and intuitive operation.

The µPolisher system has shown to significantly improve the surface quality of bulk samples observed in SEM or analyzed further with EBSD. Figure 2 shows a bulk stainless steel sample that was electrochemically polished to a create smooth scratch-free surface and then left in air for an extended time. After exposure to a 200 eV Ar^+ ion beam for 2 minutes, the sample oxidation in an area of about 400 μm^2 has been removed, enabling Electron Backscatter Diffraction (EBSD) analysis at the specific site. The size of the cleaned area can be changed simply by adjusting a number of parameters.

The µPolisher system is compatible with both SEM and DualBeam systems and has the potential to support a wide variety of applications such as reduction of the layer damaged by Ga ions in TEM lamellas, fine polishing of oxidation or contamination on the sample surface in order to obtain EBSD patterns of the highest quality, or removal of residual hydrocarbons from the sample surface prior to high resolution SEM imaging.

Key Benefits

- **Unique solution** with potential to enable large number of novel, unexplored applications
- **Very low energy milling** with a static ion beam (20 - 500eV) for the most gentle surface polishing
- ***In situ* SEM/DualBeam solution,** allowing for experimentation after cleaning without the need to break the vacuum
- **Small spot size** for precise local surface treatment without re-deposition
- **Wide range of operating conditions**, for large variety of applications
- **Fully integrated in the microscope** user interface, providing easy and intuitive operation

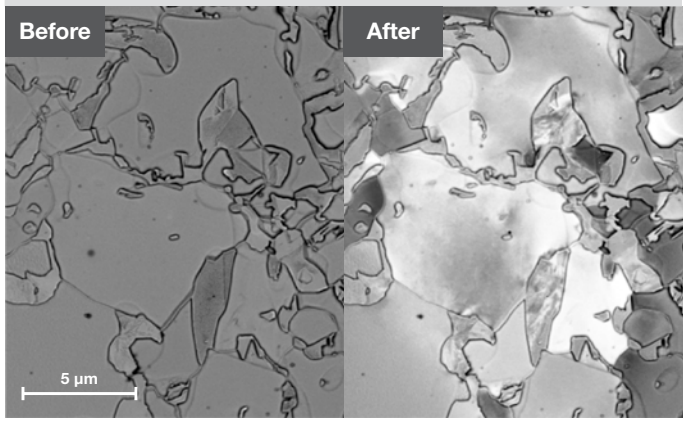

Figure 1. TRIP Steel surface cleaned for 2 minutes. Strain contrast becomes clearly visible after the treatment.

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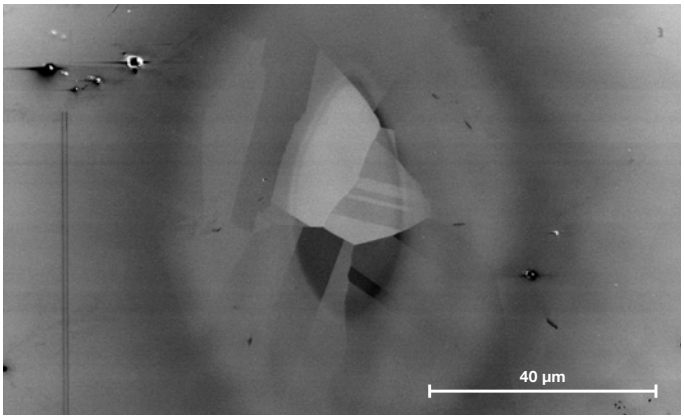

Figure 2. Stainless steel 316 cleaned for 2 minutes. Central spot reveals the microstructure on the contaminated background.

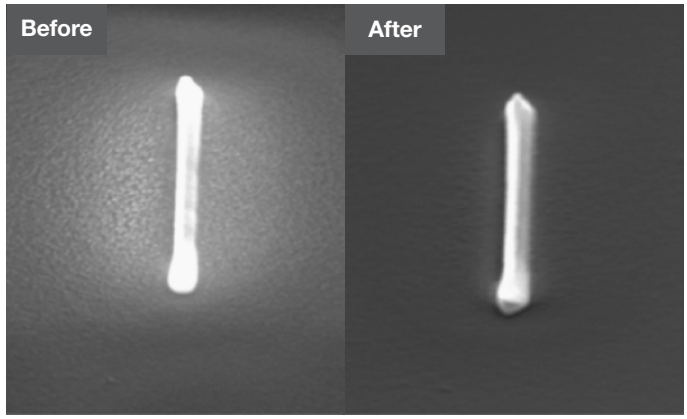

Figure 3. Removal of unwanted 'Halo' effect after Electron Beam-Induced Deposition (EBID) of Au for Plasmonic applications. The sample was cleaned with the uPolisher system for 2 minutes.

Potential applications

- Low damage milling
- Removal of oxidation layer
- Cleaning of surface from hydrocarbons
- Removal of Ga contamination
- Reduction of damage layer after FIB processing

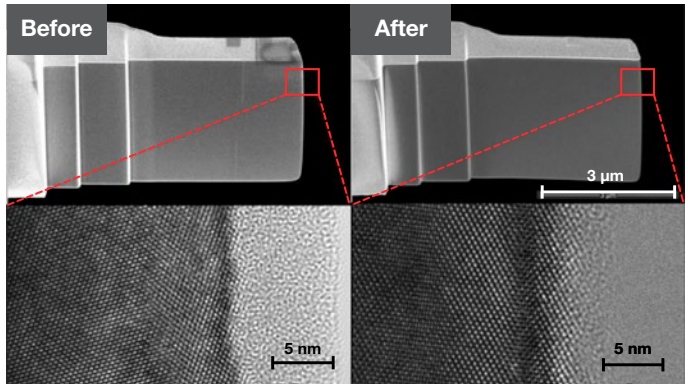

Figure 4. Si lamella before and after cleaning. SEM images show the removal of contamination from the e-beam imaging; HR-TEM images show the reduction of amorphous layer from about 9 nm to less than 2 nm.

Find out more at **Thermofisher.com/EM-Sales**

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