

# CO<sub>2</sub> Snow Jet Cleaning

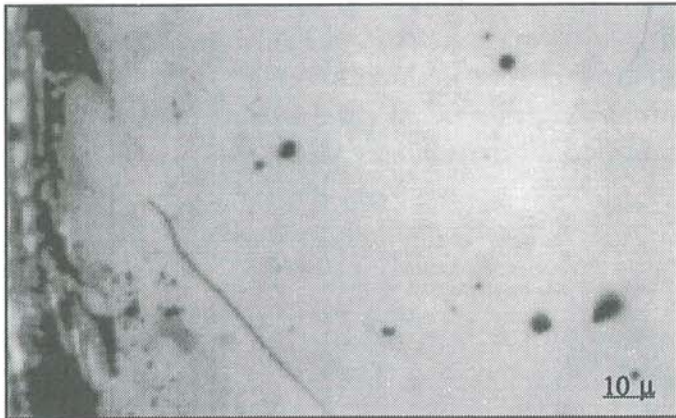
## Surface Cleaning Solutions

CO<sub>2</sub> Snow Jet cleaning uses a carbon dioxide snow plume to remove particles of all sizes (even submicron particles) and hydrocarbon-based contamination. CO<sub>2</sub> Snow Cleaning is

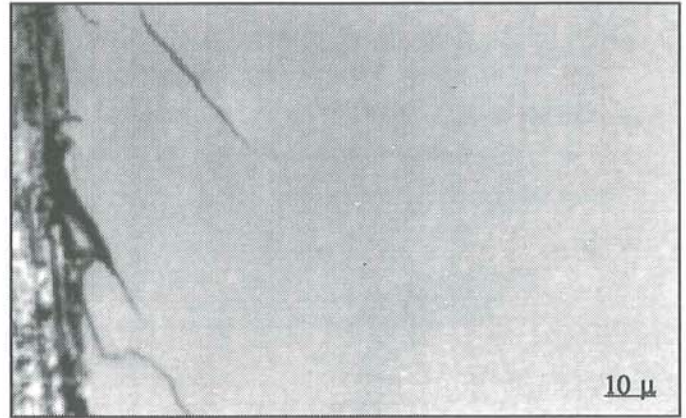
- **Nondestructive**
- **Nonabrasive**
- **Residue-free**
- **Environmentally Safe**

### Particle Removal – All Sizes

CO<sub>2</sub> snow cleaning removes particles of all sizes, even those below 0.1 micron. In the example below, we scribed a Si wafer and cleaned it with the CO<sub>2</sub> Snow Jet. Comparison of the same areas before and after cleaning (at 1000x magnification) shows complete particle removal after CO<sub>2</sub> Snow Jet cleaning. The process works on wafers, optics, metals, sensors, and many other materials.



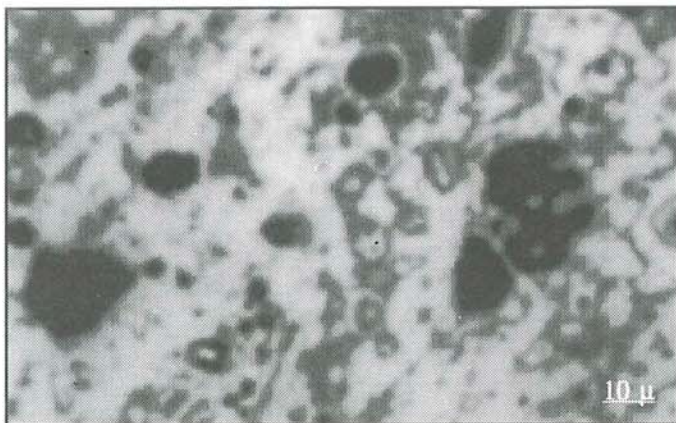
BEFORE CLEANING



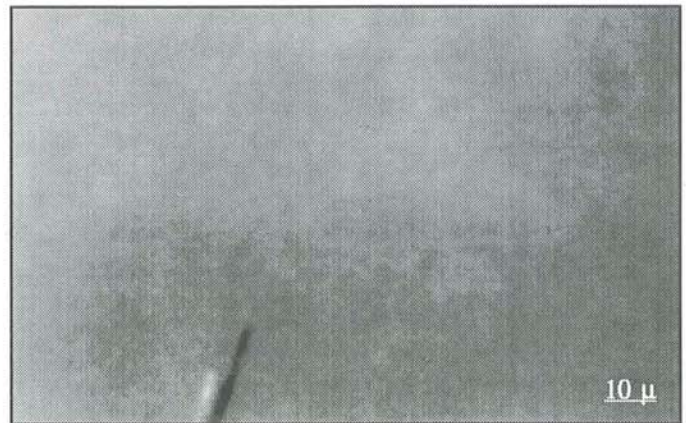
AFTER CLEANING

### Organic Removal

Here, we scribed a Si wafer and rubbed facial grease on the surface. Comparing the same area at 1000x magnification, we see that CO<sub>2</sub> Snow Jet cleaning totally removed the stain. Further analysis by X-ray photoelectron spectroscopy showed total stain removal and reductions in the background hydrocarbon content.



BEFORE CLEANING



AFTER CLEANING

***Safe, Fast, Effective***



**Mechanism** – The cleaning mechanism for the CO<sub>2</sub> Snow Jet is simple. Expanding either liquid or gaseous CO<sub>2</sub> through a small orifice leads to nucleation of small dry ice particles and a high-speed carrier gas stream. Upon impact with a substrate, the dry ice removes particulates via momentum transfer and organics via a transient solvent process. See [www.co2clean.com](http://www.co2clean.com) for details.

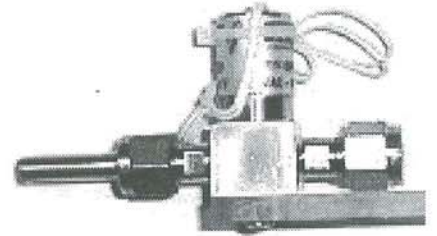
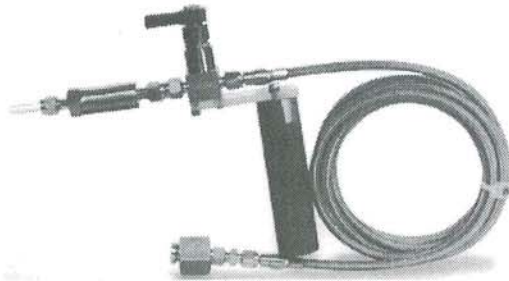
**Applications** – many different applications have been successfully demonstrated:

- Contamination removal from wafers, metals, polymers, glasses, and ceramic substrates;
- Cleaning optics, i.e., coated lenses, mirrors, lasers, IR and UV optics, fiber optics;
- Sample preparation before surface analysis (AES, XPS, SIMS);
- Sample preparation for AFM;
- General cleaning applications in laboratories, cleanrooms, and manufacturing;
- Disk drive parts and assemblies;
- Cleaning vacuum system parts, components and systems; and
- General substrate preparation and general cleaning.

**Equipment** – Four different units are offered with prices starting at about \$1600. See [www.co2clean.com](http://www.co2clean.com) for more details. The two most popular units are:

*Standard Unit* - As seen in the left image, these units include a hand-held on/off gun, a PTFE lined stainless steel flexible hose, a CGA320 cylinder fitting, and two nozzles - one stainless and one polymer. An optional pressure gauge and filter are included in the photo.

*High Purity Unit* – Similar to the standard unit but with an electropolished manual valve (middle) and all compression fittings, or this unit can be equipped with a solenoid (right).



Applied Surface Technologies

15 Richardson Drive New Providence, NJ 07093

(908) 704-6675

FAX (908) 466-7300

Email: [sales@co2clean.com](mailto:sales@co2clean.com)

[www.co2clean.com](http://www.co2clean.com)

CO<sub>2</sub>Clean

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[www.phototechnica.co.jp](http://www.phototechnica.co.jp)

フォトテクニカ株式会社

〒336-0017 埼玉県さいたま市南区南浦和 1-2-17

TEL: 048-871-0067 FAX: 048-871-0068

e-mail: [voc@phototechnica.co.jp](mailto:voc@phototechnica.co.jp)