

It's What You Don't See....

Care and Cleaning of Radiometer Optics

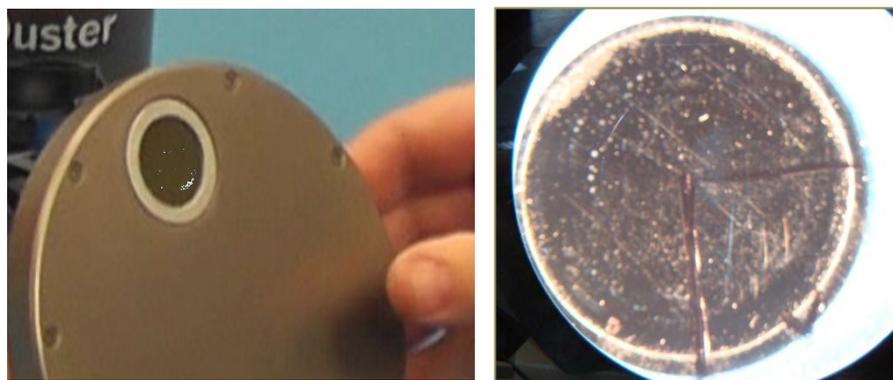
Jim Raymont & Paul Mills, EIT Instrument Markets

If the optics on your radiometer look dirty, the first reaction of many people is to clean them with whatever is handy—a shop rag, a shirt sleeve or finger. Sometimes they are cleaned with a dry cloth and other times they are cleaned with whatever solvent is handy. If there is some crusty looking stuff stuck a little to a lot of elbow grease is also applied. Other radiometers just can't resist the opportunity to go for a quick swim in your coating, ink, adhesive or resin. Beware - this kind of cleaning is likely doing more harm than good.



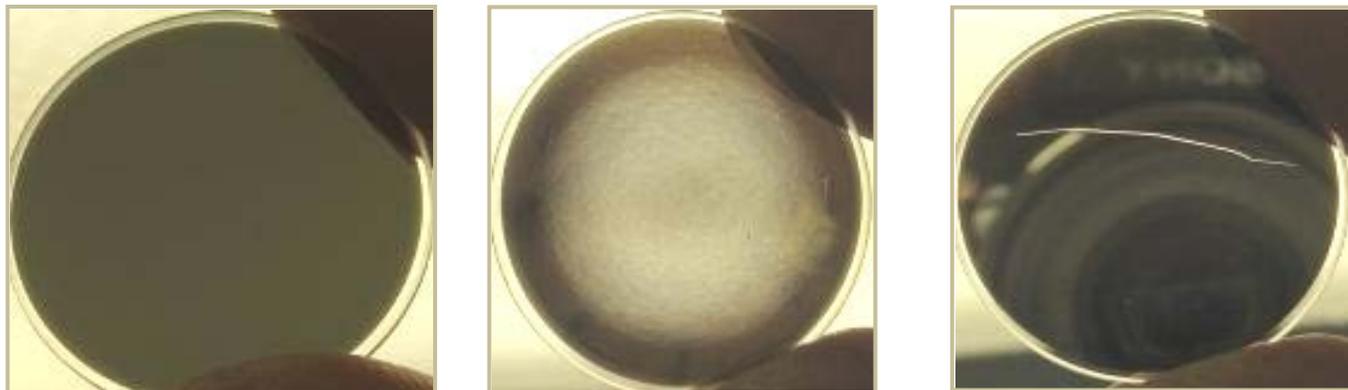
Above Left & Center: Radiometers in need of better care Above Right: Radiometer that took a swim in coatings

It's hard to imagine treating your eyeglasses, or the lens on a brand new digital SLR camera the same way the radiometers above were treated.



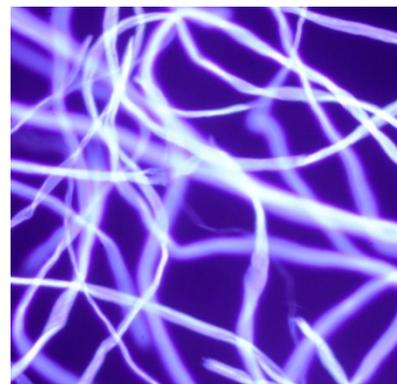
Cleaning a radiometer with the wrong tools can cause more harm than good. Above Left: Contamination on the instrument. Above Right: View of optical window under magnification that was exposed to coatings and improperly cleaned

The outer optical window of a UV radiometer is a critical to providing accurate UV measurements. It protects the internal optical components in the instrument's optical stack. While your eyes can see things in the visible spectrum, the radiometer is designed for measuring wavelengths that you can't see. This means that even though your cleaning may sparkle to the eye, it could be causing havoc with UV measurement.



The effect of improper cleaning on precision optics: Above Left: Normal Optical Window Above Center: Optical Window that was cleaned dry and with abrasive cloth Above Right: Scratched Optical Window

The cloth you use to wipe it clean may contain optical brighteners. Optical brighteners, optical brightening agents, fluorescent brightening agents, or fluorescent whitening agents are chemical additives that absorb light in the ultraviolet and violet region (usually 340-370 nm) and re-emit light, or fluoresce in the blue region (typically 420-470 nm). These additives are used in fabrics to create a "whitening" effect, making them look less yellow by increasing the overall amount of blue light reflected. Absorbance and re-emission of light can distort UV irradiance measurement by your radiometer.



Another mistake is the use of cleaning solvents that can react with wipes and swabs, dissolving materials such as fibers and glue and transferring these contaminants to the optical surface. Some aggressive solvents can also attack the radiometer components causing destruction and decomposition. Using an abrasive cloth or grinding loose dirt particles into the optical surface causes small scratches, sometimes barely visible to the eye. Since the optical components are precision materials designed to scatter light uniformly across the detector, an uneven surface can translate into inaccurate UV readings.

Invisible optical brighteners such as those coating the fibers of this cloth can cause inaccurate UV readings.

To help you correctly maintain your instrument, we've developed a recommended procedure for cleaning radiometer the optics using either cotton swabs or prepackaged EIT Instrument Wipes. EIT Wipes use a lint free nonabrasive cloth and do not contain any detergents or additives. That will help to avoid these common pitfalls, and enhance the accuracy and reliability of your device. A general

overview of cleaning optics is below with additional information including YouTube videos posted on the EIT website (www.eit.com). Also refer to information from the manufacturer of your instrument.



Visually **INSPECT** the optical surface for signs of contamination, residue, fingerprints and loose debris on or near the optical window.



BLOW any loose particulates free by holding the device vertically. Using an air bulb, clean, dry compressed air, or residue-free aerosol chemical de-duster remove loose dirt. When using de-duster, position the nozzle 10"-12" from the optical surface so that the de-duster doesn't build up on the window surface. Using the rapid moving air, not the chemical itself to blow the surface clean.



If using cotton **SWABS**, apply a liberal amount of isopropyl alcohol to the tip. Use sufficient alcohol to thoroughly wet the swab. Moving quickly (since the alcohol evaporates), use a back-and-forth motion while rotating the shaft of the swab between your fingers, clean the surface. Never reuse a swab. If more cleaning use another swab since used swabs will contaminate the surface. Use a clean dry swab to remove excess alcohol.



If using prepackaged EIT chemical **WIPES**, put on clean, disposable rubber gloves. Handle gloves from the ends. Never touch the fingers of the glove with bare hands. Gloves protect the skin and prevent oils from the skin contaminating wipe. Tear open the foil packaging, remove the wipe and unfold it gently.



Gather some of the wipe between the thumb and forefinger for cleaning. Using the gathered material, **CLEAN** the surface using a firm but gentle motion. Re-gather the wipe material occasionally so that clean, wet portions of the wipe are used to clean the surface. Repeat this procedure until the surface is clean. Always **DISPOSE** of the wipe and packaging safely, according to the instructions on the packaging.