

# Cleaning and Maintenance of Optical Components

## CLEANING OPTICAL COMPONENTS – KEY CONSIDERATIONS

It is important, and sometimes critical, that optical components should be kept clean. Wherever possible, they should be kept in boxes or covered up when not in use and handled with extreme care at all times (preferably using gloves or, in the case of very small components, tweezers).

The most appropriate method of cleaning depends on three main factors - the material from which the component is made, the type of coating and the nature of the contamination on the component. Some important considerations for cleaning are outlined below. However, any attempt to clean an optical component has its associated risks - there are no universal methods and no guarantees can be given for the following guidelines.

### MATERIAL

The ease with which an uncoated optic can be cleaned depends on the material from which it is made.

In general, components made from crown glass or fused silica are relatively hard. These can be cleaned by using a general optics cleaner and lint-free cloth. Alternatively pads and tissues can be used which, if not already presaturated, should be soaked in a suitable solvent such as acetone or isopropyl alcohol. Solvents should be used only once – pump top dispensers are a convenient method of obtaining a small amount of solvent at any one time and preventing return to the main reservoir.

Some components are made from optical materials that are much more delicate to handle, e.g. flint glasses. It is best to clean components made from these materials with high quality non-absorbent cotton wool which has been soaked in acetone. The component should be wiped in one direction and a fresh piece of cotton wool should be used for each wipe. For extremely delicate components it is sometimes safer to immerse them in solvent completely. Note, however, that cemented components such as doublets, polarizers, interference filters, etc should not be immersed in solvents.

### COATING

Many optical coatings are very durable due to the composition of the layers deposited and the stringent testing required to meet coating specifications. Fully, partially and anti-reflective coatings and dielectric beamsplitter coatings can generally be cleaned in a similar manner to uncoated components (see above).

Some coatings, however, are extremely delicate and every effort should be made to keep the need for cleaning to a minimum. In particular, bare aluminum, silver or gold coatings have only a limited adhesion to optically polished surfaces and the surface should not be touched at all. Should cleaning prove necessary the component should be immersed in solvent or flooded with it using a wash-bottle and then blown dry using a blower.

### CONTAMINANT

The two most common forms of contaminant are dust and fingerprints.

Dust:

Dust can often be removed by using a blower to remove it off the surface. Alternatively an anti-static brush can be used with care. If any dust remains this can usually be removed with an acetone-soaked swab or, for more delicate components, using the methods suggested above.

Fingerprints:

Fingerprints can be hard to remove and, if they do occur, they should be cleaned off immediately wherever possible to avoid any damage to the component or coating. Generally fingerprints can be removed with solvents using the methods outlined above. For particularly stubborn fingerprints it may be necessary first to wipe the component with or soak it in a mild neutral soap solution.