Optical Epoxy

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One of the most common methods of joining two pieces of optical glass is epoxy bonding. The two pieces of glass are coated with optic epoxy, brought together, and the epoxy is cured by applying heat, UV light or both. Some epoxy can also be cured in room temperature by time (some takes over 24 hours). Epoxy bonding is pretty reliable and the practice is manufacturing friendly since it is an inexpensive process with high yield and that is why it has been widely used in fiber optic active and passive components manufacturing.

However the fiber optic epoxy approach also has its disadvantages. The most prominent one is that it leaves an thick and variable film. So for applications that require high precision thickness control, optic epoxy is not an appropriate method.

The consequence of uncontrollable epoxy thickness can cause scattering in these thick interfaces, introducing loss. And because the epoxy is often make from organic material, these bonds cannot withstand high intensity optical powers or UV exposure. Additionally, epoxy bonds are not very heat resistant or chemically robust.

Because of these bad behaviors, the optic components can move under various thermal conditions. The optic epoxy can even dissolve with chemical exposure.

Epoxy adhesives are a very important component in manufacturing fiber optic devices. Each epoxy has a unique index of refraction and unique optical properties, like any other optical material.

All epoxy adhesives affect the light passing through the epoxy. Light can be absorbed, dispersed, and scattered by the epoxy.

The optical performance of an epoxy is dependent on the epoxy preparation procedure. Cleaning the optical contact surfaces where the epoxy is to be applied is very important in obtaining a good epoxy bonding.