

## Beryllium Reflector Materials for Research & Test Reactor Applications

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Materials test reactors are able to use various materials as reflectors, but one of the important materials is beryllium metal. Due to its low atomic number and neutron donation and multiplication characteristics, beryllium is a highly desirable reflector material for research and test reactors. Under neutron irradiation, however, beryllium will eventually form interstitial helium in its matrix, which results in swelling, and the need to replace the reflector elements.

Although the swelling phenomenon is well known and understood, up until now, only empirical factors such as the dimensional change in the beryllium reflector elements have been used to determine the timing for the need to replace the reflectors. In this paper, a variety of selected beryllium grades will be reviewed, with a look toward isolating which material properties may hold the key to ultimately determining how to optimize the lifetime of beryllium reflectors in materials test reactors.

In recent years, Materion Beryllium & Composites has also been involved in several materials test reactor beryllium reflector fabrication projects, including both new construction and reflector element replacements for existing reactors. These projects will be reviewed for technical scope, beryllium material selection, and other factors which were important in their successful execution.