



Handle with care: KBHF's Beryllium storage facility BELLA (Photo: A. Goraieb, KBHF).

## Beryllium handling facility established at Karlsruhe Institute of Technology

In January 2009, the Karlsruhe Beryllium Handling Facility (KBHF) was founded as part of the cooperation between Goraieb Versuchstechnik (GVT) and the Karlsruhe Institute of Technology (KIT). Located at KIT's North Campus, the laboratory is unique in Europe for handling and processing beryllium. It offers a user facility which enables the construction of various experiments, beryllium storage facilities as well as a laboratory for beryllium alloys. KBHF is qualified to handle large amounts of the hazardous material and plans to set up a small scale production line for beryllium alloys. KBHF maintains close contact with Brush Wellmann Inc. (BWI), the market leader for beryllium and beryllium products. KIT, KBHF and BWI are preparing a cooperation contract that will – among several other aspects – enable the production of larger amounts of special beryllium alloys if necessary.

Beryllium is both an attractive and nasty substance: lighter than Aluminium, harder than steel and robust up to high temperatures. However, it is also highly toxic: beryllium dust can harm human skin and lungs badly, its effects occurring sometimes only decades after the exposure. Once manufactured into

a solid work piece, beryllium is as harmless as any other piece of metal, but processing needs to be handled with the greatest of care. At the moment, the main consumers of beryllium are the military, aerospace and electronics industries – the latter using mostly beryllium-copper alloys. The lightweight metal is a very attractive substance for use in fusion reactors. Its hardness, its high melting point of 1284 °C and its low atomic weight make it an almost perfect material for the reactor's first wall (See FN December 2009). Furthermore, beryllium acts as a neutron multiplier when hit by fast neutrons from the fusion reaction, transforming into helium plus two neutrons. One of the two current concepts for tritium breeding blankets is therefore based on beryllium pebbles (See FN May 2009).

KBHF's roots go back more than 16 years, when Aniceto Goraieb was about to finish his diploma thesis investigating the thermal conductivity of beryllium. The facility at which he conducted the experiments closed down and he was forced to set up his own beryllium laboratory on the premises of Forschungszentrum Karlsruhe. As other materials researchers turned to him seeking advice and support, his lab slowly became a beryllium handling and consulting enterprise, building up in-depth expertise on this hazardous material. Today, Goraieb Versuchstechnik (GVT) is the

only organisation in Europe that plans, constructs and conducts beryllium experiments. It cooperates closely with fusion research at KIT, for instance, by developing fabrication techniques for beryllium-titanium pebbles as potential components for the tritium breeding test blanket modules. GVT manages the KBHF and advises other organisations when it comes to setting up their own beryllium facilities. Since 2003, GVT has been developing new beryllium alloys in cooperation with KIT. These so-called beryllides are still widely unknown and offer a huge potential for future materials. Hence, GVT plans to set up a lab-scale production facility within KBHF, which enables the handling of around 100 kg beryllium powder. KBHF aims to drive the development of beryllium technologies and has initiated workshops about "Beryllium Opportunities on New Developments" (BeYOND), bringing industrial and scientific partners together. The first workshop was held on the 13th of November 2009 at KIT. The next workshop will take place as a satellite meeting of SOFT 2010 in Porto, Portugal on October 1st 2010.

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For more information, please see:

- <http://www.kbhf.org/index.html>
- <http://www.kit.edu>
- [www.versuchstechnik.de](http://www.versuchstechnik.de)