**Tungsten – An overview on production, basic properties, processing and applications**

Michael Rieth[1], Steffen Antusch[1], Jens Reiser[1], Lorelei Commin[1], Jan Hoffmann[1], Dave Armstrong[2]

[1] Karlsruhe Institute of Technology (KIT), Institute for Applied Materials, Karlsruhe, Germany
[2] Oxford Materials, University of Oxford, UK

Tungsten is an extreme material. Of all metals it has, for example, the highest melting point, the lowest thermal expansion coefficient and the lowest vapour pressure. But tungsten has significant drawbacks which prevent its use for typical structural applications. With the advance of nuclear fusion technology the need for exceptional high heat flux components arose. And therefore, many generic designs of cooling components have been proposed which make extensive use of tungsten as armour, but also as structural material.

This presentation gives an overview of the basic properties of tungsten, its typical use, consumption and resources. Commercial production routes and processing techniques are discussed with the focus on material properties and application. It will be shown that tungsten cannot be easily used for cooling structures or other structural applications. Especially in a nuclear fusion environment, many different aspects become relevant at the same time. To illustrate some of the worst problems, different divertor designs are analysed and assessed. Finally, an outlook on alternative high heat flux applications is given.