Helmholtz Association of National Research Centres
德国亥姆霍兹国家研究中心联合会
www.helmholtz.cn

China Scholarship Council
国家留学基金委员会
www.csc.edu.cn

Helmholtz – CSC – Fellowships 2010

Helmholtz Centre: Forschungszentrum Karlsruhe

Research Field: Materials Development for Nuclear Fusion

Research Project: **Development of nanostructured tungsten alloys by severe plastic deformation (SPD)**

Position: PhD Student ☒ Sandwich PhD Student ☐ Postdoc ☐

Department/Supervising scientist: Mechanics of Solids II / Dr. Jarir Aktaa

Research Area:

Crucial issues for the application of tungsten and tungsten alloys as a structural material for future fusion power plants are the inherent brittleness at low temperatures and the relatively high brittle to ductile transition temperature of these materials. Particularly for brittle metals, the microstructure has a considerable impact on the fracture process and the fracture toughness. Severe plastic deformation (SPD) is a method to produce bulk material with ultra fine or nanostructured granular microstructure which offers unique mechanical properties. In the case of tungsten and several tungsten alloys, it has been already demonstrated that the fracture toughness can be considerably improved by applying SPD. The objective of the proposed work is to start a comprehensive study on tungsten alloys produced by SPD. The starting material will be deformed by High pressure torsion (HPT), which is one of the different existing techniques for SPD, and the influence of process parameters like temperature and applied strain on the structural evolution and material properties will be addressed. The resulting microstructure will be extensively investigated by SEM and TEM. Micromechanical tensile and bending test will be conducted to study the effect of the refined microstructure on the material properties.

Specific Requirements:

Master of Science in the area of Materials Science and Engineering: Preferentially with experimental background in mechanical and micro structural characterization of materials.

Work Place: Institut für Materialforschung II, Karlsruhe Institut for Technology (KIT)

Earliest Start (between September 2010 and February 2011)**:** September 2010

Language Course: English

Further Information: Dr. Jarir Aktaa, jarir.aktaa@kit.edu
Prof. Oliver Kraft, oliver.kraft@kit.edu

Address for application:

Karlsruhe Institut for Technology (KIT)
Institut für Materialforschung II (IMF II)
Herrman-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen, Germany