

Materials for Fusion energy technology – Improvement of thermal stability of cold-rolled tungsten sheets by potassium-doping

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Tungsten is a promising material for high-temperature applications like in future fusion reactors. To overcome the brittle behaviour of conventional tungsten, significant progress has been made in the last decade to improve the ductility of tungsten by severe cold-rolling. The thereby created fine-grained microstructure, however, is not stable at temperatures above 800 °C, leading to a recrystallized, embrittled material.

In this talk, I will present parts of our ongoing study, which utilizes potassium-doping to inhibit recrystallization in cold-rolled tungsten sheets at high temperatures. First, the evolution of rolling texture and mechanical properties with increasing rolling strain is compared to equivalently rolled pure tungsten sheets. The second part shows results from isochronal and isothermal annealing experiments, how restoration phenomena can coarsen the tungsten microstructure and the inhibition potential of potassium-bubbles with increasing dispersion.