Karlsruhe Institute of Technology

Institute for Applied Materials
Applied Materials Physics

Ductilisation of tungsten (W)

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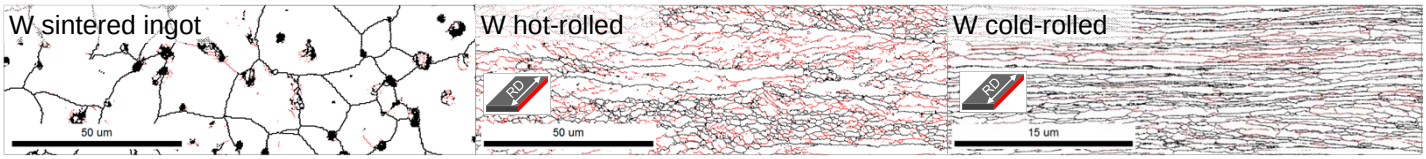
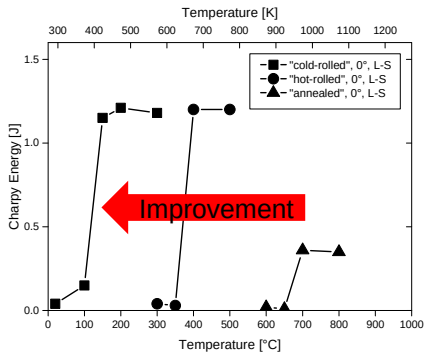
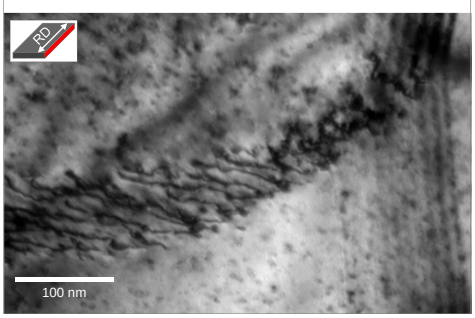
For tungsten (W), its tendency to fail at low temperatures by brittle fracture is a major limitation in its commercial exploitation. This raises the question of how to make tungsten ductile. Our ductilisation approach is the modification of the microstructure through cold-rolling.



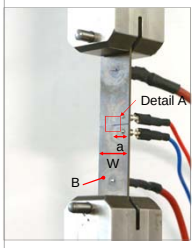
We define “ductilisation” as the simultaneous improvement of the following properties: (i) the brittle-to-ductile transition (BDT) temperature, (ii) the toughness, K_{IQ}, or crack growth resistance, R, and (iii) the tensile ductility, i.e. the uniform elongation, A_g.

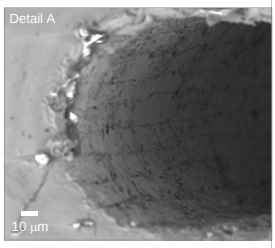
Brittle-to-ductile transition (BDT) temperature

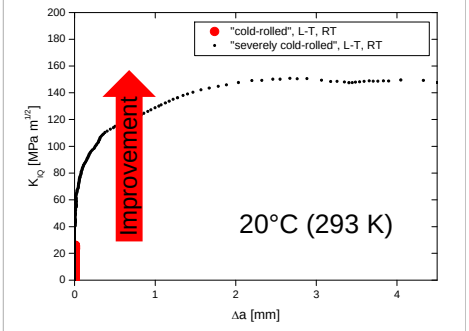


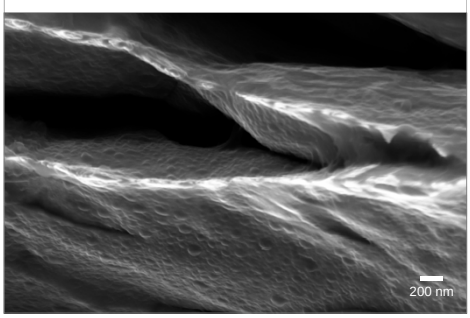


Toughness, K_{IQ}, and crack growth resistance, R

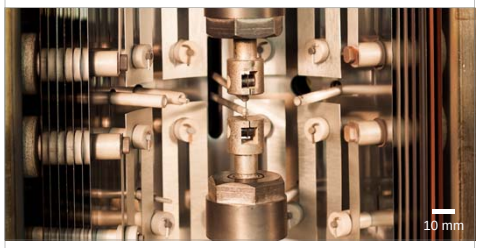


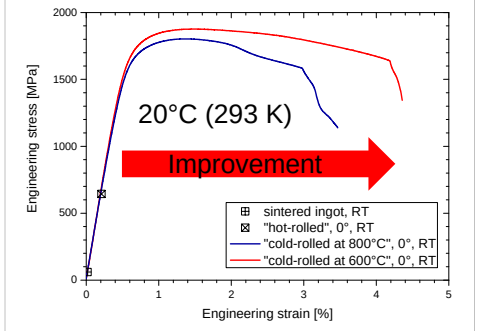


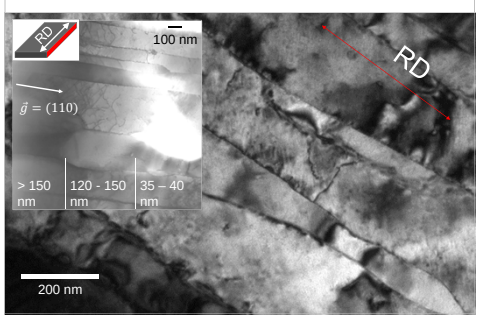




Room-temperature tensile ductility (uniform elongation, A_g)







The question on the role of rolling-induced lattice defects will be discussed in the presentations by S. Bonk et al. (B07.2, Thursday) and C. Bonnekoh et al. (B09.5, Thursday).