Material researches for ITER shielding and test blanket in China

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China joined ITER program and is developing her own materials for ITER shielding and test breeding blanket. These materials include VHP-Be, CuCrZr alloy, 316L(N) and CLF-1 (RAFM) steels. Their performances under different thermal and heat treatment conditions were studied. The Be/Cu HIP joining technology and the weld ability of 316L(N) by EB were investigated. Be/Cu mock-ups were fabricated using the joining technologies developed for FW fabrication, and will be tested at simulated ITER VDE and heat flux cycling conditions for qualification. Major test results for these materials and joining parts was reported in this paper. Chinese VHP-be showed good properties that could satisfy the ITER requirement. The CuCrZr alloy issues of fine microstructure and good mechanical strength were almost solved by a pre-forging, while the weld ability of 316L(N) by EB was demonstrated for various welding depth from 5 to 80mm. Fine microstructure and high strength with good ductility were achieved for CLF-1 steel by an optimized normalizing, tempering and aging procedure.

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