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Progress in the development of CFC/CuCrZr components for HL-2M divertor

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HL-2M is a new medium-sized copper-conductor tokamak device under construction at Southwestern Institute of Physics and can perform advanced divertor configurations, such as snowflake and tripod. An open cassette divertor structure with active water cooling has been designed to meet the operation requirements of HL-2M tokamak. The divertor consists of a flat-tile CFC/CuCrZr component and a cassette structure. The CFC/CuCrZr component is made of a water-cooled CuCrZr copper alloy heat sink armored with CFC tiles CX-2002U. The CFC surface was modified by using slurry technique to improve its wettability to copper. An oxygen-free copper (OFC) buffer layer was cast on the modified CFC surface in order to mitigate the internal stresses caused by mismatch in the coefficient of thermal expansion of CFC and CuCrZr. Vacuum brazing of OFC/CFC tiles to CuCrZr heat sink was performed by using a silver free brazing alloy. Non-destructive examination followed by high-heat-flux testing was performed to access the manufacturing quality of the joint interfaces between the CFC tiles, OFC and the heat sink. The CFC/CuCrZr components experienced cyclic tests of 7-10 MW/m2 for 1000 cycles without visible damages. High-quality bonding between CFC and the heat sink was achieved to ensure the heat removal capability of the components.

Eligible for student paper award?

No

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