VANADIUM ALLOYS FOR THE RADIATIVE DIVERTOR PROGRAM OF DIII–D*

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Vanadium alloys are attractive materials for fusion reactors due to their low neutron activation, rapid activation decay and thus minimum environmental impact, and high-temperature capability. General Atomics, in conjunction with the Argonne and Oak Ridge National Laboratories, has developed a plan for the utilization of vanadium alloys in the DIII–D tokamak which will culminate in the fabrication, installation, and operation of a vanadium structure in the DIII–D Radiative Divertor upgrade. The plan will be carried out in conjunction with General Atomics and the Materials Program of DOE/OFE. The use of vanadium will provide a meaningful step in the development of advanced materials for fusion power devices by: 1) demonstrating the in-service behavior of a vanadium alloy (V-4Cr-4Ti) and 2) developing materials processing technology on the fabrication of full-scale vanadium alloy components. The program consists of three phases: first, small coupon samples will be exposed in DIII–D at positions behind the existing divertor structure; second, one plate of the existing divertor will be replaced with a vanadium alloy V-4Cr-4Ti plate and third, during the forthcoming Radiative Divertor upgrade, the upper section of the new double-null, slotted divertor will be made of vanadium alloy components (plate, tubing, etc.). This program includes R&D efforts to support fabrication development and to resolve key issues related to environmental effects. The upper half of the new Radiative Divertor in DIII–D will be fabricated of V-4Cr-4Ti and installed by the end of calendar year 1996.

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