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Assembly of the 60 and 330°C capsules is complete and irradiation of both will begin when the HFIR returns to full power operation. Preparation of fabrication drawings for the 200 and 400°C capsules is scheduled to be completed by the end of 1988. Fabrication of parts and assembly of the 200 and 400°C capsules are scheduled for completion by mid-FY 1990; operation of these two capsules will follow the first two (60 and 330°C).

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All specimen subassemblies were assembled during this period, although the SS-3 and Tensile Bar specimens were disassembled to incorporate the redesigned holders. These will be reassembled for installation into the various capsules as the parts become available.

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Automation of the Handbook - Work is proceeding ahead of schedule in the development of an electronic materials handbook, with a prototype system now operational on the MFE computer network.

International Materials Handbook - In June agreement was reached on the creation of an International Fusion Materials Handbook, which would be under the auspices of the IEA and have a format similar to the U.S. Naterials Handbook.

Support of ITER Materials Data Base - An International materials workshop was held in August at the ITER design site to review the status of the meterials data base. Recommendations were made to create a design data book specifically tailored for use on ITER, that would not have the same level of authority as the U.S. and International Materiels Handbook.

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The existence of the high temperature miscibility gap has not been generally recognized for several reasons. Firstly, the narrowness of the miscibility gap at high temperatures virtually precludes incoherent or coherent nucleation of a new phase and limits spinodal decomposition to very small amplitude fluctuations which are hard to observe. Furthermore, the essentially equal scattering power of Fe and Ni for x-rays, as well as for electrons end neutrons makes the usual diffraction techniques inapplicable, and the fins scale of

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Irradiation creep rates of 2.2 to 14 × 10^{-4} MPa^{-1} dpa^{-1} were observed at 60°C. At 330 and 400°C irradiation creep rates of 1.3 to 3.5 × 10^{-4} were observed, similar to those found previously in similar experiments in the ORR. The low temperature irradiation creep was interpreted in terms of a new model for irradiation creep based on transient clinh-enabled glide.

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8.2 Preparation and Characterization of Alumina Containing Enriched Oxygen Isotopes (Oak Ridge National Laboratory) 315

Alumina specimens enriched in ^{17}O have been successfully fabricated from aluminum isopropoxide and water containing the ^{17}O isotope. The enrichment levels of specimens subjected to different preparation schedules were measured using a nuclear reaction analysis technique. Replacement of the ^{17}O isotope in the ceramic by atmospheric oxygen was observed to occur readily. Successful fabrication of suitably enriched alumina specimens required all processing steps to be performed in vacuum or inert environments. The optimized fabrication procedure produced enriched Al_2O_3 specimens of >99.5% theoretical density, ~10 μm grain size, and a flexural strength of 280 MPa.

8.3 Ion Irradiation Studies of Oxide Ceramics (Oak Ridge National Laboratory) 322

Specimens of Al_2O_3, MgO, and $MgAl_2O_4$ have been ion irradiated at 25 End 650°C to peak damage levels between 0.5 and 35 dpa. Initial microstructural observations have found tbat dislocation loops are formed in all three ceramics at moderate doses, with more complex extended defects observed at high damage levels. The microstructure for a given ceramic was qualitatively similar for both irradiation temperatures. The loops observed in the simple oxides MgO and Al_2O_3 were smaller and of much higher density than the loops in spinel.