

STUDIES ON RADIATION DAMAGE
WITH ION ACCELERATOR IN KAERI

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Radiation damage studies in KAERI has been performed mainly to evaluate mechanical properties of neutron irradiated structural materials. From 2002, they were systemized through strengthening on the analysis of radiation defects. When neutron irradiation is performed in a research reactor, it is not easy to get various irradiation requirements including fluence, flux and irradiation temperature. Especially the cost of neutron irradiation is one of big restrictions. However, irradiation with high energy ions allow us to carry out the evaluation of material properties at the end of lifetime in nuclear power plants and the simulation of property changes in materials of next generation nuclear system. At present, an accelerator of Korea Institute of Geoscience and Mineral Resources (KIGAM) has been used. But it is not easy to get enough beam time. Therefore, the future proton accelerator facility is expected to be installed as soon as possible. The

environment of radiation damage research makes gradual progress in Korea. In 2004, a high voltage electron microscope (HVEM) operating 1,250 keV was installed in Korea Basic Science Institute. Through the use of ion beam accelerator and HVEM, the observation of radiation defects behavior was performed. We suggest the requirements of accelerator for the research of radiation damage and the results of recent research using ion beam accelerator. To use ion beam irradiation for the simulation of neutron irradiation effect, the condition of ion beam irradiation should be controlled. Our design of irradiation chamber is introduced for the control of irradiation temperature. Some experimental results are reviewed at the point of irradiation condition effects on pressure vessel steel, stainless steel, graphite and model alloys. Finally, the effects of radiation damage to Fe-Cu alloy are discussed with the results of Fe ion irradiation and the analysis of HVEM.