

Dear Sir or Madam,

CRIEPI has been devoting research resources to the neutron irradiation embrittlement issue of the reactor pressure vessel (RPV) steels of light water reactors. RPV embrittlement is primarily caused by the formation of solute atom clusters and matrix damages, and three-dimensional atom probe (3DAP) technique has been recognized to be a very powerful research tool to characterize the solute atom clusters for more than ten years. Up to early 2000, we could characterize the details of solute atom clusters by 3DAP, but the statistics on the cluster characterization, in particular such bulk information like cluster number density, was not sufficient.

The first LEAP machine came to CRIEPI in June 2006. Since then, our experimental output has drastically changed in both qualitative and quantitative senses. Due to its very high data acquisition rate compared to the 3DAP machine of the earlier generation, combined with its wider field of view, the analysis volume was extensively increased by almost two orders of magnitude. We can characterize individual clusters in detail, can obtain good statistics on the cluster characterization, can determine cluster number density with high accuracy, and more importantly, could find new kinds of clusters normally formed at very low number density. All these data provided very important information for the modeling of RPV embrittlement and the development of a new embrittlement correlation method for the Japanese nuclear power plants.

We have upgraded our LEAP machine by attaching a laser module, which enabled us to apply this technique to other nuclear materials issues such as stress corrosion cracking issue of stainless steels and the degradation issue of zircalloy used for nuclear fuel claddings. Also, this year we have replaced the detector, DT-80, with DT-200, which again made the field of view four times larger than before.

The advantages to use LEAP are, of course, its current data acquisition capability and its sophisticated computer software for system control and data analysis. However, we would like to emphasize that the robustness of the LEAP system is really important aspect for experimentalists, and also the Imago's continuous effort to improve the

system capability is another very important aspect. This is why we introduced second LEAP machine equipped with a reflectron in our institute this year.

Yours sincerely,



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