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80 eV DEUTERIUM DEPTH PROFILES IN TUNGSTEN: THE
CTR FIRST-WALL IMPURITY PROBLEM

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ABSTRACT

Imaging Field-Desorption Mass Spectrometry has been
used to depth profile 80 eV deuterium ions implanted into
tungsten with an in-situ ion source. After controlled field
evaporation in vacuum (10^{-10} Torr), a mass spectrum, obtained
during each desorption event, is processed to obtain relative
abundance for all species observed at a given depth. Spectra
from partial evaporations of the (110) plane are summed, so
that species abundance vs. (110) layer evaporated (or depth
into the lattice) can be determined. The depth profiles
obtained exhibit a broad maximum peaked at 
\( \mu 55 \mu \), in agree-
ment with theoretical, projected range calculations of 80 eV
deuterium in tungsten. Structure in the distributions may
reflect the presence of energetic neutrals produced by the
ion source; ion chaneling in the near surface region, or
deuterium diffusion during the time of the experiment. In
order to evaluate the effect of ambient adsorption during
implantation, low-field desorption without implantation was
performed on the specimen. The results of these experiments
will be presented, and interpreted in the context of the CTR
first-wall impurity problem.

In addition, the use of field-desorption depth profiles to
infer details of the energy distribution of the implanted species
will be discussed as a new, in-situ, CTR diagnostic technique.

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