Lawrence Livermore Laboratory

DT FUSION NEUTRON IRRADIATION OF LLL

INITIAL DAMAGE RATE SAMPLES AT 4.2°K

AND LLL SrCl_2

Unclassified

Susan C. MacLean

April 30, 1976

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Dr. Michael W. Guinan of LLL carried out initial damage rate studies with niobium, molybdenum, and vanadium wire samples at 4.2°K while the samples were being irradiated by the LLL Rotating Target Neutron Source (RTNS). Dr. Richard A. Meyer of LLL supplied a SrCl_2 sample to be irradiated at room temperature during the same period, April 12 to 16, 1976.

Niobium dosimetry foils were put on the front and back sides of the cryostat cold finger in which the initial damage rate samples were centered. The cryostat cold finger was put as close to the neutron source as possible. The powdered SrCl_2 sample was enclosed in a plastic capsule with niobium dosimetry foils on the front and back. The capsule was attached to a rod and put as close to the neutron source, at an angle, as the cryostat would allow. The niobium dosimetry foils used were 12mm in diameter and approximately 0.13mm thick.

The neutron irradiation was carried out by the LLL E Division Accelerator Staff. Neutron production was monitored continuously with a proton recoil counter and recorded each hour. The dose record is attached. The total beam-on time was 54.92 hours.

Following the irradiation, the apparatus was allowed to sit for a few days in order to let short-lived isotopes decay. Then the SrCl_2 sample was returned to R. Meyer and the niobium dosimetry foils were delivered to Ruth Anderson in the LLL Radiochemistry Division. She carried out the gamma ray counting.

The average fluence of each dosimetry foil was calculated using the method described in UCRL-51393, Rev. 1. However, the cross section used for the activation of the 10.16 day isomer of niobium by 14.8 MeV neutrons was changed to 458 millibarns. The results were as follows:

<u>Dosimetry Foil</u>	<u>Fluence (n/cm^2)</u>
Nb-480	3.78×10^{16}
Initial Damage Rate Samples	
Nb-481	3.45×10^{15}
<u>Dosimetry Foil</u>	<u>Fluence (n/cm^2)</u>
Nb-561	3.22×10^{15}
SrCl_2 Sample	
Nb-562	1.76×10^{15}

The estimated overall uncertainty of these results is $\pm 7.5\%$. The relative uncertainty between any two values is about $\pm 2\%$. The values given here represent average fluences over the volume of each dosimetry foil.

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RTNS IRRADIATION OF APRIL 12 TO 16, 1976

30 APR 76

09:15:16

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