Irradiation study of Ti-6Al-4V and Ti-6Al-4V-1B for FRIB beam dump: Preliminary results

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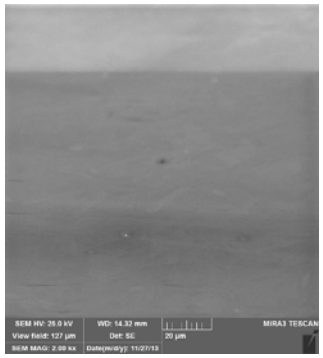
Outline

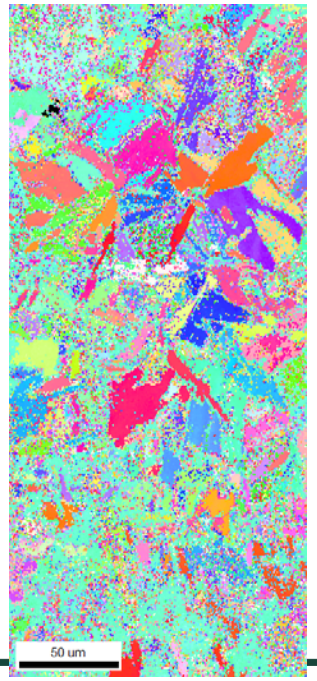
- Irradiation of samples with high energy heavy ions (NSCL-MSU)(Ca 40 @ 50 MeV/u) and low energy heavy ions at CIMAP-France(Ar 36 @ 36 MeV).
- Surface characterization using SEM-EBSD
- Comparing the same areas on the samples before and after irradiation.

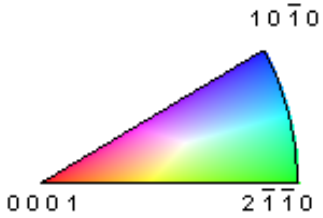
Observations

- Deterioration of the quality of the EBSD scan after irradiation.



Sample 3 Ti64-1B
Irradiated at T-350C and a fluence of 1.00E+15
Ions/cm and dpa of 0.038dpa





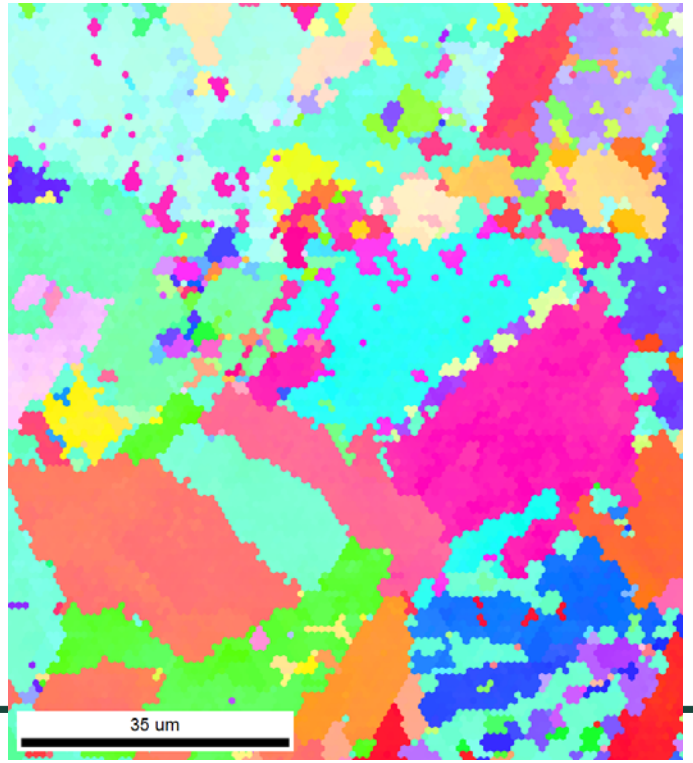
IPF map before irradiation

IPF map after irradiation

Close analysis of few grains:

Before irradiation

After irradiation

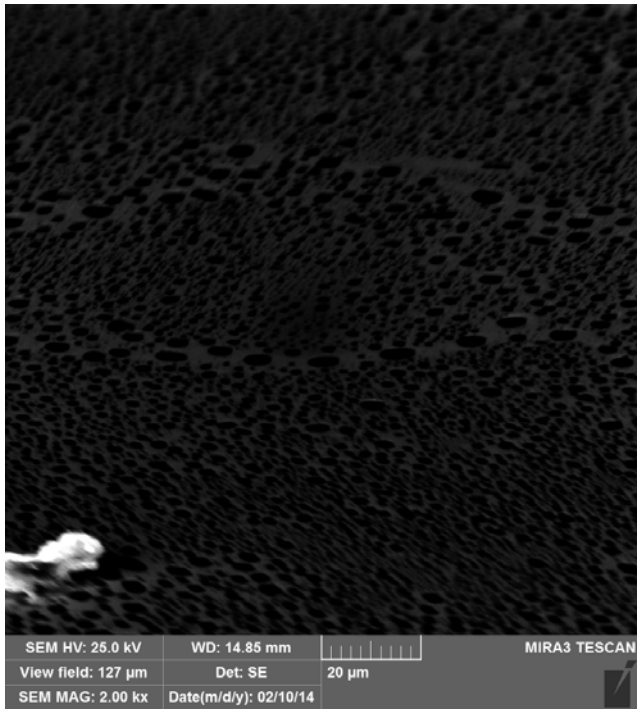


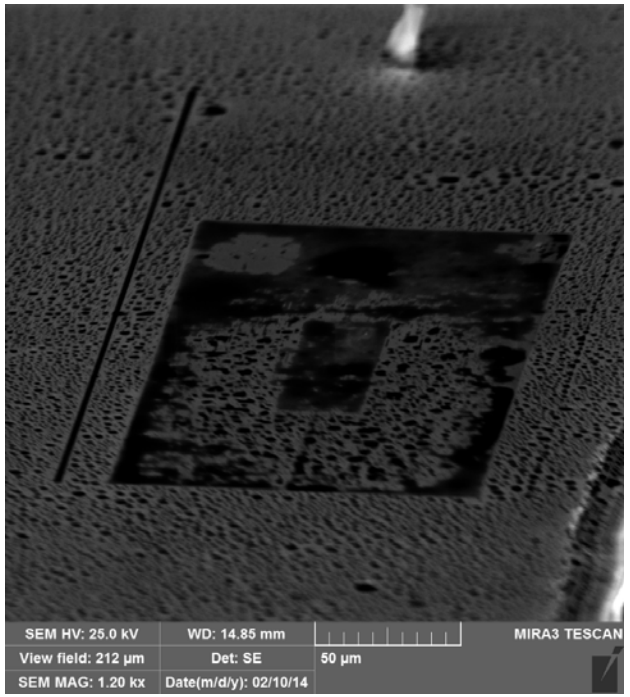
Samples irradiated at high fluence and low Temperature

Sample 4 Ti64
Irradiated at T=20C and a fluence of 1.00E+15 Ions/cm , estimated dpa of 0.038dpa

- No-EBSD possible

-EDS analysis to get the composition of this layer





Conclusion and future work

- No or little change in the grain orientations at the surface of the samples.
- Nano-indentation: Obtain the properties of the materials in depth
- FIB: characterize the microstructure in depth