



RaDIATE

2nd Annual Collaboration Meeting

May 19 2015

Welcome, News & Meeting Objectives

Radiation Damage In Accelerator Target Environments



Since we last met...

- 6 RaDIATE Meetings (including this one)
 - Not bad, about once every 2 months
- Studies (or explorations) continued at various institutions
 - Beryllium
 - Graphite
 - Titanium alloys
 - Tungsten
- Added 6 institutions (now 11 institutions strong!)
 - MOU revision signed by all (but still need to collate)
- Did not succeed in establishing an online repository for material properties/characteristic for accelerator irradiated materials



Welcome to all Participants!

In the coming weeks:

- Create Master Original and Distribute
- Establish new Collaboration Council Representatives
- Create accounts on Council Downloads Area web-site

for Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

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Didcot



RaDIATE Objectives

- To generate new and useful materials data for application within the accelerator and fission/fusion communities
- To recruit and develop new scientific and engineering experts who can cross the boundaries between these communities
- To initiate and coordinate a continuing synergy between research in these currently disparate communities, benefitting both proton accelerator applications in science and industry and carbon-free energy technologies



Not so simple!

- We have done a good job in the first 2 years or so:
 - Understanding the target irradiation environment
 - Understanding the techniques that can be used
 - Starting to study previously irradiated materials
 - Engaging nuclear materials expertise in our application
- We have uncovered some fundamental questions that need to be answered before we can fully harness the data
 - How to **validate** and benchmark Monte Carlo codes for DPA and gas production
 - How do high energy irradiations **correlate** to lower energy irradiations
 - How does “micro-behavior” **correlate** to “macro-behavior”?



Moving forward

- In **Parallel** and with equal **Priority**
 - Move forward with generating **material behavior data** for our irradiation/loading environments
 - Perform experiments to answer fundamental questions of **validation** and **correlation**

Only then will we be able to efficiently and effectively study these very convoluted phenomena



My objectives for our meeting

■ LEARN

- recent results from ongoing studies
- new (or new to me) techniques for PIE
- what has been done to go from “micro” to “macro”

■ DISCUSS

- ways to **validate/correlate** MC codes with measurements
- ways to **correlate/simulate** HE irradiations with LE ion irradiations
- ideas to test irradiated materials under pulsed beam loading

■ PLAN & ORGANIZE

- near-term experiments that shed light on both fundamental **correlation/validation** issues as well as application-specific material behavior data



Near-Term RaDIATE Experiments

- Discussion to be held on Wednesday afternoon
- Be prepared to input:
 - Materials of interest (as specific as possible)
 - PIE testing of interest (tensile, thermal, microscopy, etc)
 - Irradiation environment (especially temperature)
- Keeping in mind that we want to also answer questions of **validation** and **correlation**
 - Any well-researched “standard” material?
 - Use ion beam irradiation to “match” that of already irradiated material (e.g. NuMI Be window)
 - What studies have already been done that shed light on these issues (that we may want to extend to our regime)?



Objective: RaDIATE Theme Song!





Enjoy the meeting and Oxford!

RaDIATE

10 keV protons into Beryllium (simulated with SRIM 2008 and artistically rendered with Graphic Converter by P. Hurh)

Radiation Damage In Accelerator Target Environments