

# **Qualitative Models for Grass and Cone Morphologies Observed on He-Irradiated W**



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## Goal

Examine the "grass" and cone structures in more detail in order to develop a qualitative theory for their formation.

### **Research Methods**



# Conclusions

•Surface morphology suggests

Irradiation Facility: The Materials Irradiation Experiment (MITE-E) •ion gun with two adjustable electrostatic lenses to make an ion beam of He<sup>+</sup>

•Nd-YAG variable power laser to maintain a constant temperature during irradiation

### Pyrometer





200 nm



-He bubbles break the surface where they encounter the least resistance.

-Certain grains form pores before others.

**Stage 3**, ~10<sup>18</sup>-10<sup>19</sup> He/cm<sup>2</sup>



-Individual pores are still visible, but the structure has some overall directionality on each grain.



**Stage 4**, >10<sup>19</sup> He/cm<sup>2</sup>:



-More pores form, creating oblong features and chains of pores.

-Material is preferentially sputtered from within the pores, which starts to connect neighboring pores.

-Individual pores are no longer apparent.

-The balance between the sputtering and diffusion is a periodic structure, the grass structure.

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200 nm