NE 795 Advanced Reactor Materials and Materials Performance

Exam 4

The associated point values provide an indication of the expected thoroughness of response.

1. Why are different cladding/structural materials required for advanced reactor systems? (8 pts)
2. What are some considerations when optimizing the composition for F/M steels? (8 pts)
3. Why do ferritic steels swell considerably less than austenitic steels? (6 pts)
4. What role do the oxide particles play in ODS steels? (5 pts)
5. What are some advantages and disadvantages of Ni alloys? How is strength improved in Ni alloys? (8 pts)
6. What are the unique features of conditions inside research reactors compared to LWRs? (10 pts)
7. Why is amorphization of concern in research reactors? (6 pts)
8. What are benefits and drawbacks of U-Si fuel compared to U-Al fuel? Why is there a push towards U-Mo fuel? (6 pts)
9. Describe the differences in U3Si and U3Si2 swelling. (6 pts)
10. The gamma phase of U-Mo is not the thermodynamically stable phase at research reactor temperatures. Why is this phase the dominant phase in-reactor? (7 pts)
11. What effect does the solidus/liquidus gap have on fabrication of U-Mo fuels? (6 pts)
12. Discuss the evolution of fission gas bubbles in U-Mo fuel as a function of burnup. (10 pts)
13. What is the role of the Zr layer in U-Mo monolithic fuels? (6 pts)
14. Why is Al ideally suited for the research reactor environment when it is unable to be used in LWRs? (8 pts)