

反应堆工程

U-10Mo/Al-Si固体扩散行为

刘云明; 尹昌耕; 孙长龙; 陈建刚; 孙旭东; 杨红艳; 郭振

中国核动力研究设计院 核燃料及材料国家级重点实验室, 四川 成都 610041

收稿日期 修回日期 网络版发布日期:

摘要 采用扩散偶方法研究U-10Mo合金与Al-xSi(x=0, 1, 2, 5, 7, 9, 质量分数)合金的固体扩散行为。实验在真空热压炉中完成, 退火温度为555、570、580、590和595 °C, 时间为5~10 h。实验结果表明: 退火条件对扩散行为有显著影响, 580 °C是U-10Mo/Al-xSi扩散行为的重要分界点; 当温度低于580 °C热压退火处理时, 扩散层厚度随Si含量的增加先急剧减小然后缓慢增大; 当温度高于580 °C时, 扩散层的厚度随Si含量的增加而增加。Si含量较高(≥2%)的扩散偶扩散层厚度比低Si含量的小, 扩散层呈3层结构, 靠近Al-Si侧出现贫Si区。成分分析显示: Si含量较高的扩散偶, 靠近U-Mo侧的扩散薄层中出现Si的富集, 其成分为(U, Mo)(Al, Si)_x(x≤3); 靠近Al-Si合金侧的扩散层成分为(U, Mo)(Al, Si)_x(x>3)。

关键词 [U-Mo合金](#) [Al-Si合金](#) [扩散偶](#) [扩散层](#)

分类号

Diffusion Behavior on U-10Mo/Al-Si Alloys

LIU Yun-ming, YIN Chang-geng, SUN Chang-long, CHEN Jian-gang, SUN Xu-dong, YANG Hong-yan, GUO Zhen

National Key Laboratory for Nuclear Fuel and Material, Nuclear Power Institute of China, Chengdu 610041, China

Abstract The diffusion behavior between U-10Mo and Al-Si alloys was studied with diffusion-couple method. The couple was annealed in a high vacuum heat-pressure furnace at 555, 570, 580, 590 and 595 °C, respectively for 5-10 h. Annealing conditions have a significant effect on interaction-layer thickness. When temperature is lower than 580 °C with pressuring, the thickness suddenly decreases then slowly increases with the Si content increasing; however, when temperature is higher than 580 °C the thickness increases with the Si content increasing. Interaction layer with higher Si content which thickness is lower than that with lower Si content is composed of three layers. Si-rich layer with the composition of (U, Mo)(Al, Si)_x(x≤3) closes to U-10Mo side, Si-poor layer with the composition of (U, Mo)(Al, Si)_x(x>3) closes to Al-Si side.

Key words [U-10Mo alloy](#) [Al-Si alloy](#) [diffusion-couple](#) [interaction layer](#)

DOI

通讯作者

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [\[PDF全文\]\(3618KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)

参考文献

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“U-Mo合金”的 相关文章](#)

本文作者相关文章

- [刘云明](#)
- [尹昌耕](#)
- [孙长龙](#)
- [陈建刚](#)
- [孙旭东](#)
- [杨红艳](#)
- [郭振](#)