

研究论文

原位XPS技术研究碳化铀的表面氧化

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摘要 采用X射线光电子能谱(XPS)原位分析研究了298 K时烧结UC的清洁表面在O₂气氛中的初始氧化过程. UC试样清洁表面通过氩离子束长时间溅射获取. 初始反应各阶段U4f, O1s和C1s芯能级谱的变化显示样品表面的氧化产物为UO₂和自由碳. 当O₂饱和和吸附后, UC表面氧化膜的增长呈抛物线型, 氧透过氧化膜的扩散为UC进一步氧化的速率控制步骤. 定量分析表明, 反应过程中U, C原子均未出现明显的表面偏析.

关键词 [原位XPS](#) [UC](#) [O₂](#)

分类号

Investigation of Surface Oxidation of Uranium Monocarbide by *in situ* XPS Technique

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Abstract The initial oxidation of sintered UC samples in oxygen atmosphere at 298 K has been investigated *in situ* by X-ray photoelectron spectroscopy (XPS). Initially a "clean" UC surface was prepared by long time Ar⁺ bombardment. The changes of U4f, C1s and O1s spectra during oxidation indicate that the adsorption and reaction of oxygen on UC surface led to the formation of uranium dioxide and free carbon. Fast oxidation was found to be initially followed by a parabolic growth of an oxide film, suggesting that the oxidation be controlled by oxygen diffusion through the oxide layer. Quantitative analysis reveals that no significant segregations of uranium and carbon to the surface were observed at different oxidation stages.

Key words [in situ XPS](#) [UC](#) [O₂](#)

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