

快报

金属铀表面铝薄膜生长行为的XPS研究

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摘要 摘要: 在室温、超高真空条件下, 采用Ar离子溅射沉积的方法在清洁金属铀表面沉积铝薄膜, 并利用X射线光电子能谱分析技术原位观察铝薄膜的生长行为。结果表明, 在薄膜生长过程中, 铀铝界面存在较明显的互扩散行为, 同时发生一定程度的相互作用, 生成金属间化合物UAl_x, 导致铀、铝XPS特征谱发生明显变化。铀铝间的互扩散导致U 4f谱在380.4、392.7和404.2 eV处出现新的能量损失峰; 而铀铝金属间化合物的生成导致Al 2p XPS谱峰向低能端偏移0.2 eV。随沉积时间的增加, 能量损失峰强度逐渐增强, Al 2p 峰逐渐向金属Al特征峰位置偏移, 说明随铝沉积量的增加, 铀铝间的扩散行为增强, 铀铝相互作用生成的金属间化合物组分并非单一。在沉积过程中, 铝薄膜以岛状方式生长。

关键词 [铀](#); [铝薄膜](#); [XPS](#); [生长模式](#)

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XPS Study on Process of Aluminum Deposition on Uranium

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Abstract Aluminum overlayers on uranium were prepared by sputtering deposition at room temperature in ultra-high vacuum (UHV) chamber. And the process was studied by X-ray photoelectron spectroscopy (XPS). The goal of this work was to study the growth mode of aluminum overlayers as a function of coverage. During deposition, interdiffusion takes place at the Al/U interface, and obvious changes can be observed from the U 4f and Al 2p spectra. The U 4f spectra of Al/U interface show strong correlation satellites at binding energy of 380.4 and 392.7 eV, and plasma loss features at 404.2 eV, respectively. Intensities of the plasma loss features increasing with the coverage of aluminum are corresponding to the enhancement of interdiffusion. Some interactions of aluminum and uranium which yield intermetallic compound UAl_x were detected, and this induced 0.2 eV chemical shift to low binding energy to the Al 2p peaks. The result also shows aluminum overlayers grown on uranium follows the volmer-weber mode.

Key words

[uranium](#) _ [aluminum](#) [overlayer](#) _ [XPS](#) _ [growth](#) [mode](#)

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