

STUDY OF THE DIFFUSING BEHAVIOR OF MoO₃ and ZnO ON OXIDE THIN FILMS BY SYNCHROTRON RADIATION TXRF

Yuying Huang¹, Weiming Xu², Junqian Xu², Nianzu Wu², Jingfeng Yan², Yongfa Zhu³, Wei He¹, Youchang Xie²

¹Beijing Synchrotron Radiation Facility, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100039, China

²State Key Laboratory for Structural Chemistry of Unstable & Stable Species, Institute of Physical Chemistry, Peking University, Beijing 100871, China

³Analysis Center, Tsinghua University, Beijing 100084, China

The monolayer dispersion phenomenon has been extensively applied in the preparation of heterogeneous catalysts and absorbents. The diffusing process of MoO₃ and ZnO on stable oxide thin films (SiO₂, Al₂O₃, and TiO₂) was investigated mainly by means of SR-TXRF. Since this technique has much lower elemental detection limits than those of X-ray Photoelectron Spectroscopy (XPS) and Secondary Ion Mass Spectrometry (SIMS), it is very appropriate to be used to analyze the specimens with a monolayer or submonolayer of MoO₃ or ZnO on the surface. A stripe of MoO₃ or ZnO on the oxide thin film was used as the diffusion source. After thermal treatment, MoO₃ diffused onto the surface of those films and formed a monolayer or a submonolayer. The diffusion capacity and the diffusion rate of MoO₃ on each film differed significantly. Sublimation of MoO₃ was also detected during the diffusion process. A possible explanation to all the phenomena is the combination of surface diffusion onto the surface of the support and transportation via gas phase. By contrast, ZnO hardly diffused onto the surface of the film due to its high melting point.