

Development of high reflectance Cr/V multilayer mirror for water window applications

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Abstract

Imaging and spectroscopy in the “water window” ($\lambda=2.3-4.4\text{nm}$) has been long pursued in the fields of biology and material science, driven by the natural contrast between carbon and oxygen, and the high spatial resolution provided by the short wavelength. Besides the high quality sources, multilayer mirror is another key component for the water window microscope. Due to the short working wavelength, the d-spacing of the multilayer is only 1-2nm. This imposes a severe challenge for the fabrication of such multilayer mirrors. Cr/V multilayer is one of the promising candidate working near the V-L edge ($\lambda=2.4\text{nm}$) [1]. To develop high reflectance multilayer mirror for this region, the physical structure inside the multilayer with different layer thicknesses were investigated which indicate an obvious polycrystallization of the structure. Interface engineering was further applied to the Cr/V system which produced a maximum reflectance of 24% near the V-L edge at 42° grazing incidence [2,3].

References

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