

The near infrared absorption properties of $W_{18}O_{49}$

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Characterization: The phase compositions of the samples were determined by X-ray diffraction analysis (XRD, Shimadzu XD-D1) using graphite-monochromized $CuK\alpha$ radiation. The size and shape of the nanoparticles were observed by a transmission electron microscope (TEM, JEOLJEM-2010). HRTEM images and SAED images were obtained on a ZEISS LEO 922 with an accelerating voltage of 200 kV. The optical properties were measured using a spectrophotometer (JASCO V-670), giving an output of transmittance in the UV, visible, and infrared ranges (200-2700nm), where the $W_{18}O_{49}$ powder was dispersed in a collodion-ethanol mixed solution at a mass ratio of ethanol: collodion: $W_{18}O_{49}$ = 1.0: 0.93: 0.15, then, the coating solution was painted on a quartz glass by an applicator with a concave shape and a depth of 12.5 μm . Thermographic measurements were recorded by a thermographicmeter (FLIR System i7).

