Construction of a meteor spectroscopic observation system using a low-cost HD-quality monochrome high-sensitivity video camera and analysis of its emission composition

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Spectroscopic observation of a meteor is a technique to observe the light emitted by a meteoroid using a diffraction grating. By examining the observed spectra, information about the compositions of the meteoroid can be revealed. In recent years, spectroscopic observation has been attracting attention in the field of meteor observation due to the improvement of camera performance and development of observation software. The author's laboratory has been conducting meteor radio and infrasound observations, but this is the first attempt at meteor spectroscopy. The purpose of this research is to construct a meteor spectroscopic observation system using a low-cost HD-quality monochrome high-sensitivity video camera, and to observe the spectra of meteors. We will also analyze the observed spectra to reveal the composition of the meteors. The camera is a ZWO ASI178MM with a maximum resolution of 3096 ×2080 pixel. The lens is an Edmund Optics ones with a focal length of 8.5 mm and with F 1.3. The angle of view is 47.0˚× 32.8˚. For spectroscopy, we used a transmission brazed grating with 300 lines/mm from Edmund Optics. This combination of equipment was able to capture spectra of stars up to +1 magnitude.We compared the relative intensities of Fe, Na, and Mg from three meteor spectra obtained during observation period from December 7 to 14, 2020, and classified the spectra. In the future, we would like to make a camera housing to enable continuous operation.

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