A survey of near-infrared diffuse interstellar bands

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Diffuse interstellar bands (DIBs) are ubiquitous absorption lines in the spectra of the reddened stars, which originate from foreground interstellar clouds. Although the carriers of most DIBs have not been successfully identified yet, they are considered to arise from the gas-phase carbonaceous molecules, such as fullerenes, polycyclic aromatic hydrocarbons (PAHs) and carbon-chain molecules [1]. The observational studies of DIBs may play an important role toward the understanding of the properties and chemistry of large organic molecules in interstellar medium.

To identify their carriers and investigate their interstellar properties, we are conducting the first comprehensive survey of the DIBs in near-infrared (NIR) wavelength range, where the ionized large molecules, such as PAHs and fullerenes, are considered to have absorption bands. The data have been collected with the NIR high-resolution (R=28,000) spectrograph WINERED, which offers a high sensitivity in the wavelength coverage of 0.91-1.36 micron. We successfully found a number of new NIR DIBs, some of which are detected at the wavelengths close to the peaks of the absorption bands of PAH cations [2]. In addition, the high transmittance of the NIR wavelength range enables us to explore the environmental dependence of the DIB carriers in the dusty environment [3]. We will present some results obtained in this survey and future prospects.

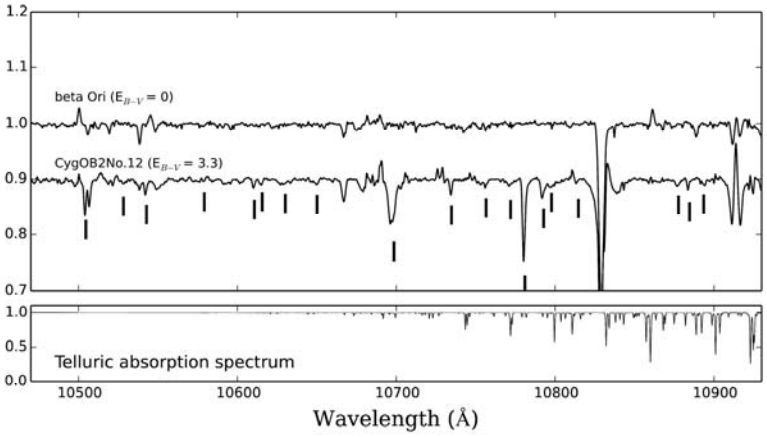

Figure 1: Upper panel: The spectra obtained with WINERED. The DIBs (thick lines) are detected only in the reddened object (lower spectrum). Lower panel: The model spectrum of telluric absorption lines.

References

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