Liquid-Crystal-Based Tunable Lyot Filter Spectra Camera System
Combined with Color CCD Detector

M. Yamano, S. Kado, S. Kushita, S. Watanabe, S. Tanaka
School of Engineering, The University of Tokyo, Tokyo 113-8656, Japan
a Institute of Advanced Energy, Kyoto University, Kyoto 611-0011, Japan

E-mail: morifumi.yamano@flanker.n.t.u-tokyo.ac.jp

For the purpose of applying imaging measurement to the He I spectroscopy, a spectra camera system using a Liquid-Crystal-Based tunable Lyot filter for the VIS range (400-720 nm) has been proposed [1]. The typical passband and transmittance of the filter are 7 nm FWHM and 14%, respectively.

We have pointed out that the filter has a problem called “leak-bands,” which were observed at wavelength longer than 590 nm at a specific wavelength setting below 448 nm—their exact values are slightly dependent on lot. In a past research, Red-Green-Blue selectable filter based also on the liquid-crystal technology was installed as a broad band-pass filter to avoid this feature [2].

What we proposed in this paper is an alternative method using a color type imaging detector (CCD, CMOS etc…). Its on-chip RGB color filter enables the compact spectra camera system [3].

The color CCD we use is the Bitran BU52C (2048×2048 pixels, 7.4×7.4 μm²/pixel, USB interface, 16 bits) equipped with an external trigger input. We have checked that, in 400-760 nm, there is no interference in the transmission bands between the blue and red filters whose boundary is at around 560 nm. Therefore, leak-band-free images at each wavelength can be obtained from the corresponding color layer of the recorded image format.