Dynamic Response of the Chromosphere in a Solar Flare
Based on Spectroscopic Observations

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Dynamic phenomena occur in the chromosphere in relation to flares, while their origin and dynamic characteristics are still unknown. A detailed study of flare kernels will lead to a new understanding of heating mechanism of the chromosphere and energy release process in the corona. We performed coordinated observations with IRIS, Hinode and the Domeless Solar Telescope (DST) at Hida Observatory and acquired multi-wavelength data of a C5.4 flare on 2014 Nov. 11 with ever highest special and temporal resolutions. The DST slit-scan observation provided us simultaneous spectroscopic information of the Ca II K/8542Å and H-alpha lines. From the sit-and-stare observation by IRIS, we obtained spectra of the Mg II h/k/triplet, C II, Si IV lines. We analyzed these chromospheric spectra of flare kernels that ware located on the slit. The features of the spectra are as follows. (1) In the early phase of the flare, blue asymmetry in the Mg II h/k lines lasted for ~30 sec at each spatial point of the kernels, which was followed by red asymmetry in all these chromospheric spectra for ~100 sec during the impulsive phase of the flare. (2) As for the blue asymmetry of Mg II h/k spectra, the whole intensity was moderate, though the blue wing intensity was a little stronger than the red wing. (3) With respect to the red asymmetry, the whole intensity was strong, which was distinguished as the strong emission in the red-side compared to the blue-side. (4) There was no detectable difference in the starting time of the red asymmetry among these chromospheric lines observed by IRIS with the temporal resolution ~10 sec. (5) The red asymmetry was composed of short lived multiple components with a life time comparable to the temporal resolution. We show these observational results and discuss them.