

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

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PPS025-02

Room:101

Time:May 23 14:30-14:45

Properties of Dust Formed around Wolf-Rayet Binary System based on Infrared Observations

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We have carried out the mid-infrared multi-epoch observations of periodically dust-forming Wolf-Rayet binary system WR140 with Cooled Mid-Infrared Camera and Spectrometer (COMICS) onboard Subaru telescope. WR140 is one of the nearest Wolf-Rayet binaries and the secondary is known to come across the periastron of the primary Wolf-Rayet star with a period of ~8 years accompanied by distinct variations in light curves at various wavelengths, often termed as the "spectroscopic events". In particular, the variations in infrared light curves are supposed to be closely related to the dust formation event during the periastron. Therefore, multi-epoch mid-infrared high-angular resolution observations of WR140 using 8m-class telescopes provide us quite unique and valid opportunity to investigate the process of dust formation and its evolution associated with the active mass ejection by evolved massive stars. In this presentation, we discuss the properties (e.g., compositions, mass, temperature) of the expanding dust clouds of WR140 formed during the periastron events at 2001 and 2009 based on our multi-epoch mid-infrared imaging and spectroscopy with Subaru/COMICS.

Keywords: circumstellar dust, silicate, carbonaceous dust, mid-infrared observation, subaru Telescope