Polarimetric research on S- and Q-type Near-Earth Asteroids

*Jooyeon Geem¹, Masateru Ishiguro³, Yoonsoo P. Bach¹, Daisuke Kuroda², Hiroyuki Naito³, Yoonyoung Kim¹, Yuna G. Kwon¹, Masataka Imai⁴, Kiyoshi Kuramoto⁴, Makoto Watanabe⁵, Ryo Okazaki⁶

1. Department of Astronomy, Seoul National University, 2. Okayama Astrophysical Observatory, National Astronomical Observatory of Japan, 3. Nayoro Observatory, 4. Department of Cosmosciences, Graduate School of Science, Hokkaido University, 5. Faculty of Science Department of Applied Physics, Okayama University of Science, 6. Hokkaido University of Education, Asahikawa Campus

Polarimetry is a useful technique for investigating the physical properties of the target's surface. The dependency of the polarization degree on the phase angle (the angle between Sun-target-the Earth, $\alpha$) produces the polarization curve which contains parameters, for example, the minimum and maximum polarization degrees occurring at the phase angle $\alpha \sim 20$ degree and $\alpha \sim 100$ degree. In particular, polarimetric observations at large $\alpha$ provide valuable information regarding the regolith size, which is difficult to be determined via other observation techniques (i.e., photometry and spectroscopy).

Despite the advantages, however, only a few asteroids were observed with polarimetric devices at the large phase angles. The most asteroids have been studied at the low phase angles ($\alpha < \sim 20$ degree) due to the unfavorable geometric condition (i.e., they exist outside of Earth orbit). Here, we present our new polarimetric research of Near-Earth-Asteroids (NEAs) observed at the large phase angle. We focus on S- and Q-type asteroids in this presentation. We thus conducted observations of asteroids: (331471) 1984 QY1, (90075) 2002 VU94, and (66391) 1999 KW4 using Pirka Telescope (Nayoro Observatory, Hokkaido University) at the phase angle $\alpha \sim 100$ degree, which allows us to get maximum polarization degrees of these objects. Based on the observational results together with two objects ((1566) Icarus and (4179) Toutatis in reference papers [1], [2]), we will discuss the implication of the grain size on their surfaces.

[1] Ishiguro et al., (1997), PASJ.

Keywords: Asteroid, Polarimetry