

**Extremely red  $K - [3.6]$  galaxies: a candidate passive population at  $z \sim 6$** Ken Mawatari<sup>1</sup>, Toru Yamada<sup>1</sup><sup>1</sup> *Tohoku University***Abstract**

With a combination of ultra deep and wide infrared survey data from the *Spitzer* Extended Deep Survey (SEDS) and the UKIRT Infrared Deep Sky Survey, we selected objects satisfying  $K - [3.6] > 1.3$ . From spectral energy distribution (SED) fitting, we found our color selection identifies a variety of galaxy types, including (1) post-starburst galaxies at  $z \geq 5$ , (2) dusty star-forming galaxies at  $z < 4$ , (3) nebular line emitters at  $z > 4$ , and (4) Type-2 AGNs. Significant fraction of red  $K - [3.6]$  galaxies are identified as AGNs or dust obscured galaxies at  $z = 1 - 4$ . While we failed to isolate significant fitting solutions individually for the remaining red galaxies, we identified some candidates of passive galaxies at  $z \geq 5$  which are characterized by relatively blue  $[3.6] - [4.5]$  colors. Stacked SED of the three candidates in the SEDS UDS field is well fit by the post-starburst template with  $M_* = (5.8 \pm 0.8) \times 10^{10} M_\odot$  at  $z \sim 6$ . The stellar mass density of these post-starburst galaxy candidates,  $(8.2 \pm 4.8) \times 10^{-7} M_\odot \text{Mpc}^{-3}$ , is much lower than that of star-forming galaxies, but the non-zero fraction suggests that initial star-formation and quenching have been completed by  $z \sim 6$ . We also discuss this observational results with the recent semi-analytic model galaxies.