Geological context of co-existence areas of olivine-rich and plagioclase-rich materials on the lunar surface based on hyperspectral remote-sensing data

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A global survey of the lunar surface using hyperspectral data obtained by Spectral Profiler (SP) onboard Kaguya/SELENE has revealed the existence of several kilometer wide sites with exposures of olivine-rich materials [Yamamoto et al., 2010]. All the olivine-rich sites identified by SP are shown to be associated with large impact basins, suggesting that the large basin formation played an important role to form the olivine-rich sites on the lunar surface. It has also been reported that some olivine-rich sites show the co-existence of olivine-rich and plagioclase-rich materials, which correspond to purest anorthosite (PAN) [Ohtake et al. 2009], on a kilometer scale. For example, Yamamoto et al. [2012] reported that the distinct area with the olivine-rich spectra on a landslide feature on the crater wall of a 7-km sized crater in the Schrödinger basin is adjacent to an area showing plagioclase-rich spectra. The studies of the occurrence trend and geological context of the co-existence of olivine-rich and plagioclase-rich materials would provide an important constraint on the interpretation of the origin of the olivine-rich materials, that is, mantle origin or lunar lower crustal origin. Also, the area of the co-existence could be appropriate for "one-stop" sites to access the lunar mantle and crust materials in future sample return missions. However, no detailed studies of the occurrence and geological context for the co-existence areas have been done in the other lunar basins with the olivine-rich sites except for the Schrödinger basin. In this presentation, we will report the occurrence and the geological context of the co-existence areas of the olivine-rich and plagioclase-rich materials in Crisium and Moscoviense basins as well as Schrodinger basin based on the multiband data obtained from Multiband Imager (MI) and SP onboard Kaguya/SELENE.

Ohtake et al. Nature, 461, 236-240, 2009.
Yamamoto et al., Nature Geoscience, 3, 533-536, 2010.
Yamamoto et al., Icarus, 218, 331-344, 2012.

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