

Application of FactSage to design lunar resource processing in “Lunar Metallurgy”

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FactSage application is executed to design the lunar resource processing in our laboratory. The moon's surface consists of fine particles called “Lunar Regolith”, which are divided into “Mare and Highlands” by region. The Mare region is mainly composed of basalt, and is roughly divided into a high-Ti and a low-Ti basalt region according to the concentration of titanium. In addition, the Mare region contains various minerals including such as iron oxide and is subject to extraction. In particular, the Mare region contains about 15 to 20 wt% of Fe oxide, and various processes have been proposed to extract it. However, Fe oxide contained in Lunar Regolith exists as compounds such as olivine, pyroxene, and ilmenite, and thermodynamic information is lacking on such as the equilibrium phase of slag coexisted with these minerals due to temperature changes. Therefore, in this study, as a study for “Lunar metallurgy”, FeO reduction behavior for various concentrations of Ti in Lunar regolith was investigated using FactSage. Firstly, in order to understand the reduction behavior of FeO, the equilibrium state was investigated for the change in temperature and Ti concentration in the slag. In addition, the reduction behavior of ions among minerals containing Fe due to temperature change at low oxygen partial pressure was investigated.