NEW ROCK TYPES FROM MARS: TRACE ELEMENT SIGNATURES IN NWA 7034 CLASTS. Y. Chen[1], Y. Liu[1], Y. Guan[2], C. Ma[2]. [1]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, USA; [2]Div. Geol. & Planet. Sci., California Institute of Technology, Pasadena, CA 91125, USA. (Email: Yang.Chen@jpl.nasa.gov).

Introduction: NWA 7034 contains new types of igneous rocks from Mars that were not represented by the SNC meteorites [1, 2, 3]. The new types may provide more information on magmatism on Mars. Here we investigate rare-earth element concentrations in common minerals in lithic clasts in NWA 7034 in order to further assess the characteristics of the magmatic sources.

Samples and Methods: We studied feldspars, pyroxenes, and apatites in six lithic clasts in NWA 7034. These clasts belong to the basaltic and trachyandesite types described in [3]. The concentrations of rare earth elements and Y were analyzed using secondary ion mass spectrometry.

Results: The preliminary results show that most plagioclases ($An_{48-36}Ab_{50-61}Or_{2-4}$) are enriched in LREE and have positive Eu anomaly, similar to maskelynites in shergottites. Alkali feldspars ($An_{20-0}Ab_{20--78}Or_{6-80}$) are common in trachyandesite type clasts, but no reliable data are obtained yet because of abundant apatite inclusions in them. All apatites ($F_{0.1-0.7}Cl_{0.9-0.3}$) have high REE concentrations with LREE enrichment and negative Eu anomaly. The concentrations are higher than previous apatite data in NWA 7034 and shergottites [4]. Low-Ca pyroxenes ($En_{56-44}Fs_{37-46}Wo_{3-11}$) show large variations in REE patterns, similar to previous reports on NWA 7034 [3]. Some pyroxenes have LREE-depleted patterns with small negative Eu anomaly, while others have high and flat patterns with large negative Eu anomaly. Taking all pyroxene data together, the La concentrations vary by a factor of ~700, while Lu by a factor of ~6.

The REE of each clast was estimated by adding the concentrations in each mineral phase using their modal abundances. All six clasts yielded REE patterns with enriched LREE, flat HREE, and negative Eu anomaly. These features are similar to the whole rock data of NWA 7034 [1] and the whole clast data in NWA 7533 [2]. However, the REE concentrations in this study are higher than those in [2], and the La/Lu values are slightly higher than the whole rock in [1].

Discussion: The inter-clast differences in the REE patterns could reflect different degree of partial melting in the martian mantle. Despite the differences, the high REE concentrations and LREE enrichment in the igneous clasts in NWA 7034 are in contrast to the depleted shergottites, indicating the primitive nature of their magma sources.

References: [1] Agee C.R. et al. 2013. *Science* 339:780-785. [2] Humayun M. et al. 2013. *Nature* 503:513-516. [3] Santos A.R. et al. 2015. *GCA* 157:56-85. [4] Shearer C.K. et al. 2015. *MAPS* 50:649-673.