Thursday, March 22, 2012
POSTER SESSION II: LUNAR MELTS:
NEW INSIGHTS FROM ISOTOPES, IMPACTS, AND EXPERIMENTS
6:00 p.m. Town Center Exhibit Area

Vander Kaaden K. E. Agee C. B. McCubbin F. M.
A Comparison of Melt Density and Compressibility of the Green, Yellow, and Orange Apollo Glasses as a Function of TiO_2 Content **[#1584]**
This study investigates the density and compressibility of the green, yellow, and orange Apollo glasses. The difference in compressibility between these glasses is currently attributed to their vastly different TiO_2 contents from 0.24 to 9.12 wt%.

Gombosi D. J. Baldwin S. L. Watson E. B. Swindle T. D. Delano J. W. Roberge W. G.
Argon Diffusion in Lunar Impact Glass **[#2364]**
Diffusion kinetics of Ar in Apollo 16 lunar impact glasses have been experimentally determined . These kinetics allow the calculation of how much radiogenic Ar has been lost by diffusion on the lunar surface, which may alter apparent $^{40}Ar/^{39}Ar$ ages.

Spicuzza M. J. Valley J. W. Ushikubo T.
Li Concentration and Isotope Ratio in Lunar Zircons: Li-Enriched and Depleted Magmas on the Moon **[#2878]**
Lithium concentrations and isotope ratios were measured in lunar zircons. The bimodality of [Li] suggests the presence of Li-enriched and depleted magmas on the Moon.

O'Sullivan K. M. Neal C. R. Simonetti A.
A Crystal Stratigraphy Approach to Understanding Melt Evolution in the Apollo 12 Ilmenite Suite Basalts **[#2431]**
Using a crystal stratigraphy approach, a detailed petrogenetic model and crystallization sequence for 12062 is presented here.

Dygert N. J. Liang Y. Hess P. C.
The Effect of Melt TiO_2 on Fe-Ti Oxide-Picritic Basalt HFSE Partitioning: Parameterized Models, Lunar Applications **[#2033]**
We measured HFSE partition coefficients for Fe-Ti oxides and picritic basalts, and developed parameterized partitioning models. HFSE Kd's are strongly affected by melt TiO_2. Models are applied to mare basalt petrogenesis and lunar armalcolite.

Yao L. Liang Y.
An Experimental Study of the Solidus of a Hybrid Lunar Cumulate Mantle: Implications for the Temperature at the Core-Mantle Boundary of the Moon **[#2258]**
Solidus and phase relations of a mixture of ilmenite- and cpx-bearing cumulate and harzburgite lunar mantle are examined. Temperature of the lunar core-mantle boundary is estimated as 1360°–1400°C, based on the solidus of this study.

Sedaghatpour F. S. Teng F.-Z. Liu Y. Sears D. W. G. Taylor L. A.
Behavior of Magnesium Isotopes During Lunar Magmatic Differentiation **[#2884]**
In order to provide an internally consistent estimate of the Mg isotopic composition of the Moon, we studied 47 well-characterized lunar samples including mare basalts, highland impact melts, mare breccias and regolith samples.

de Vries J. van Westrenen W. van den Berg A.
Radiogenic Heat Production in the Moon: Constraints from Plagioclase-Melt Trace Element Partitioning Experiments **[#1737]**
We estimate radiogenic heat production in the Moon, and its depth distribution, by combining highland surface concentrations of U, Th, and K with experimental constraints on the distribution of these elements between anorthositic plagioclase and melt.

Sakai R. Kushiro I. Nagahara H. Ozawa K. Tachibana S.
Constraints on the Bulk Composition of Lunar Magma Ocean from Conditions of Crust Formation; Critical Reevaluation of Separation Mechanism of Anorthite **[#2849]**
The bulk composition of the lunar magma ocean was constrained to satisfy the formation condition of lunar anorthosite crust. We showed that the lunar magma ocean was likely to be enriched in FeO compared to the BSE.

Sun C. Liang Y.
Trace Element Partitioning Between Low-Calcium Pyroxene and Lunar Picritic Glass Melts at Multiple-Saturation Points with Applications to Melting and Melt Migration in A Heterogeneous Lunar Cumulate Mantle **[#1952]**
Trace-element D values of opx or pigeonite vary by less than a factor of two for various melt and mineral compositions at multi-saturation points. We employ a simple model and show the importance of lunar source composition to mare basalt genesis.

Zhang N. Parmentier E. M. Liang Y.
Instability and Distribution of Ilmenite-Rich Cumulates After the Overturn of an Initially Stratified Lunar Mantle **[#2641]**
Geochemical observations suggest lunar mantle is heterogeneous. We use a thermochemical convection model to explain the distributions of ilmenite-bearing cumulates and KREEP. It provides constraints for lunar evolution.

Galenas M. Righter K. Danielson L. Pando K. Walker R. J.
Experimental Study of the Partitioning of Siderophile Elements in a Crystallizing Lunar Magma Ocean **[#2270]**
This study focuses on experimentally determining partition coefficients for a variety of elements including the highly siderophile elements. Conditions of these experiments are designed to approximate a crystallizing lunar magma ocean.

Liu J. G. Ash R. D. Walker R. J.
Fractionation and Remobilization of Siderophile Elements in Metal Grains of Apollo 16 Lunar Impact-Melt Breccia 67095 **[#2683]**
The metal globules in Apollo lunar impact-melt breccia 67095 exhibit fractionated surface to interior compositions of siderophile elements. The data show that the globules were derived from siderophile-rich impactor, and crystallized outward.

Schaffer L. A. Niihara T. Kring D. A.
Petrology of an Impact Melt Clast from Lunar Regolith Breccia 60016 **[#1174]**
The petrology and major element composition of a small-volume lunar impact melt clast are examined. Sample 60016,321 is fine-grained, porphyritic, and composed mainly of olivine (18.5 %), pyroxene (47.8 %), plagioclase (31.0 %), and metal (2.2 %).

Niihara T. Kring D. A.
Petrology of the Centimeter-Size Impact Melt Clasts in Ancient Regolith Breccia 60016 **[#1229]**
Here we report petrological analyses of five impact clasts in 60016. The petrological texture and mineral compositions data suggest these clasts in 60016 possibly represent five different types of impact melts.

Fagan A. L. Neal C. R.
Negative Eu Anomalies in Plagioclase: KREEP-Like Contaminant of Impact Melt? **[#1426]**
Some plagioclase crystals from several Apollo 16 impact samples display negative Eu anomalies in their REE patterns rather than the expected positive. This can be explained by contamination of the impact melt by a form of KREEP such as (W-)QMG.

Neal C. R. Fagan A. L.
Petrogenesis of Apollo 16 Impact Melts **[#2248]**
Textures coupled with whole rock and mineral compositions of igneous textured impact melts provided heretofore unseen insights into impact melt petrogenesis.