Friday, March 23, 2012
PLANETARY INTERIORS: DYNAMICS AND DIFFERENTIATION
1:30 p.m. Montgomery Ballroom

Chairs: **Valerie Hillgren**
Rajdeep Dasgupta

1:30 p.m. Kendall J. D. * Melosh H. J.
Fate of Iron Cores During Planetesimal Impacts **[#2699]**
Chemical equilibrium in the Earth's mantle depends critically on the emulsification of cores of impacting planetesimals. We show that the impact process greatly disperses cores and allows for greater emulsification.

1:45 p.m. Fei Y. * Zhang C.
Imaging Percolation During Core Formation by High-Resolution 3D Tomography **[#2242]**
We present a new imaging technique to visualize the distribution of liquid metal in silicate matrix in three-dimensions, providing a new way to investigate the efficiency of metal percolation in a real silicate mantle and core formation process.

2:00 p.m. Zhang Y. G. Yin Q.-Z. *
Light Elements in the Core and Degree of Chemical Equilibration During Core-Mantle Segregation: A Window Through First-Principles Molecular Dynamics **[#1360]**
We use first-principles molecular dynamics to calculate light-element contents in the core and gauge the degree of chemical equilibrium between metallic core and silicate mantle during accretion using light-element contents as the constraint.

2:15 p.m. Roskosz M. * Bouhifd M. A. Jephcoat A. P. Marty B. Mysen B. O.
Nitrogen Solubility in Molten Metal and Silicate at High Pressure and Temperature: A First Experimental Approach **[#1497]**
Nitrogen solubility is studied up to 18 GPa on a mixture of molten Fe-bearing silicates and Fe-Ni metal alloy. Nitrogen depletion relative to other volatiles can be accomplished by a moderately efficient segregation into the core-forming material.

2:30 p.m. Hillgren V. J. * Fei Y.
The Partitioning of Si Between Metal and Silicate: Implications for Planetary Cores **[#2886]**
We experimentally examine the the partitioning of Si between metal and silicate. We apply the results to the core of Mercury.

2:45 p.m. Shahar A. * Kaufman L. A. Horan M. F. Mock T. D. Deng L. Macris C. A.
Iron Isotope Fractionation During Planetary Differentiation **[#2049]**
Experiments at high pressure and temperature reveal an iron isotopic fractionation between metal and silicate, where the metal is more enriched in $^{57}Fe/^{54}Fe$. This result agrees with the direction of fractionation seen in pallasites.

3:00 p.m. Dasgupta R. * Chi H. Shimizu N. Buono A. Walker D.
Carbon Cycling in Shallow Magma Oceans of Terrestrial Planets Constrained by High P-T Experiments **[#1767]**
High-pressure-temperature experiments are performed to constrain the solubility, speciation,and partitioning of carbon between metallic and silicate liquid in a magma ocean environment. We discuss the role of magma ocean processes on the deep C-cycle.

3:15 p.m. Li J. * Liu J. Chen B. Li Z. Wang Y.
Chemical Convection in the Lunar Core from Melting Experiments on the Iron-Sulfur System **[#2474]**
Experimental results on the liquidus curve of the Fe-S system at the pressures of the lunar core provide constraints on the Moon's thermal and chemical states and the role of chemical convection in the origin of early lunar core dynamo.

3:30 p.m. Jing Z. * Wang Y. Yu T. Sakamaki T. Kono Y. Park C.
Density and Sound Velocity of Iron-Sulfur Alloying Liquids at High Pressures and Implications to Planetary Cores **[#2813]**
We determine the density and sound velocity of Fe-S liquids at high P-T conditions up to 8 GPa and 2173 K. The results can be compared with geophysical observations to constrain the composition and structure of the cores of Moon and Mercury.

3:45 p.m. Yu G. * Jacobsen S. B.
Core Formation Memory of Siderophile Elements in Earth and Mars **[#1573]**
We define a concept-core formation memory of a siderophile element as to how far back in a planet's core formation history the current mantle content of the element can record. The memories of siderophile elements in Earth and Mars are reported.

4:00 p.m. Righter K. * Humayun M.
Volatile Siderophile Elements in Shergottites: Constraints on Core Formation and Magmatic Degassing **[#2465]**
A suite of martian shergottites has been analyzed for 73 elements. We focus on the volatile siderophile elements, derive martian mantle abundances, and evaluate early differentiation scenarios for Mars.

4:15 p.m. Touboul M. * Liu J. G. O'Neil J. Puchtel I. S. Walker R. J.
Time Constraints on Late Accretion to the Earth and Moon, and New Evidence for Early Mantle Differentiation Derived from Coupled Investigations of W and Os Isotope Compositions **[#1923]**
We report ^{182}W excesses in ~4.2-Ga-old rocks from the Nuvvuagittuq greenstone belt. Combined with HSE and ^{142}Nd data, these isotopic anomalies indicate differentiation of Earth's mantle earlier than the giant impact and the formation of the Moon.

4:30 p.m. Jacobsen S. B. * Yu G.
Extinct Isotope Heterogeneities in the Mantles of Earth and Mars: Implications for Mantle Stirring Rates **[#2210]**
On the basis of both extinct (^{182}Hf-^{182}W and ^{146}Sm-^{142}Nd) and long-lived (Sr and Nd) isotope systems we have shown that the mantles of Earth and Mars exhibit substantially different mixing or stirring rates (~500 m.y. and 2000 m.y., respectively).