Friday, March 14, 2008
PLANETARY DIFFERENTIATION
1:30 p.m. Crystal Ballroom B

Chairs: **E. Cottrell**
V. Debaille

1:30 p.m. Yu G. * Jacobsen S. B.
A W-Isotope Evolution Model with a Deep Magma Ocean and a Solid Lower Mantle: Application to Mars and Earth **[#1847]**
A core-formation model with a deep magma ocean and a solid lower mantle has been formulated for the Hf-W system. Based on this model, W isotope data of martian meteorites imply that the mean age of Mars is 0.3–1.6 m.y. after the formation of the solar system.

1:45 p.m. Debaille V. * Brandon A. D. Yin Q.-Z. Jacobsen B.
Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhlites **[#1615]**
We investigated the relationship between the source of nakhlites and a crystallizing martian magma ocean using new ^{143}Nd, ^{176}Hf, and ^{142}Nd, and previous ^{182}W data.

2:00 p.m. Draper D. S. *
Constraining the Depth of Martian Magma Ocean Crystallization: Role of Garnet Composition **[#1313]**
The effect of pressure on the majorite content of garnet can be used to place constraints on at least the minimum depth of crystallization of an early Mars magma ocean.

2:15 p.m. Warren P. H. *
A Depleted, Nonchondritic Bulk Earth: The Explosive-Volcanic Basalt Loss Hypothesis **[#2443]**
I propose that recent evidence for Nd/Sm depletion in Earth's mantle may be a bulk-planet trait, acquired as a result of explosive-volcanic basalt loss from Earth's roughly 100-km-sized planetesimals. The model planetesimals are analogized to ureilites.

2:30 p.m. Khan A. * Connolly J. A. D.
Constraining the Bulk Major Element Composition of the Earth's Lower Mantle — A Geophysical Perspective **[#1245]**
We have investigated the composition of the Earth's lower mantle using a variety of geophysical data and our results seem to suggest a lower mantle that is compositionally distinct from the upper mantle.

2:45 p.m. Agee C. B. *
Compressibility of Water in Magma: Effect on Planetary Differentiation **[#1157]**
Hydrous magma density crossovers are predicted for the mantles of Mars and Earth.

3:00 p.m. Righter K. *
Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? **[#1936]**
Siderophile element depletions in the angrite parent body are estimated and shown to be compatible with segregation of a small reduced core from chondritic body, followed by degassing and oxidation of basalt.

3:15 p.m. Cottrell E. * Walter M. Walker D.
W Partitioning Between Liquid Metal and Liquid Silicate as a Function of P, T, fO_2, X_{carbon}, and Melt Structure: Implications for the Earth, Moon, Mars, and Vesta **[#2238]**
We present 103W partitioning experiments between liquid metal and liquid silicate as a function of P, T, fO_2, X_{carbon}, and silicate melt structure from 1723–2673 K and 0.5–18 GPa.

3:30 p.m. Rohrbach A. * Ballhaus C. Golla-Schindler U. Ulmer P. Schönbohm D.
Experimental Evidence for a Highly Reduced Earth's Upper Mantle **[#1810]**
High-pressure pyroxene and majoritic garnet contain large amounts of ferric iron despite being synthesized in redox equilibrium with metallic iron. The Earth's upper mantle at depths greater than 250 km is therefore likely to be iron metal saturated.

3:45 p.m. Elkins-Tanton L. T. * Seager S.
Effects of Oxidation on Building Rocky Planets: From Mercury to a Coreless Terrestrial Planet **[#1366]**
Differentiation in terrestrial planets is expected to include a metallic core. We suggest that oxidation state may determine the size of any metallic core, and we predict the existence of planets that have differentiated but have no metallic core.

4:00 p.m. Malavergne V. * Gallien J. P. Berthet S. B. Bureau H.
Carbon Solubility in Metallic Phases at High Pressure and High Temperature: Preliminary Results and Application to Planetary Cores **[#1340]**
This study attempts to evaluate the solubility of carbon in metallic phases at high pressure and high temperature thanks to a nuclear microprobe. We will present our first results and their applications to the planetary cores.

4:15 p.m. Fei Y. * Deng L. Corgne A.
Effect of Carbon and Sulfur on Iron Melting at High Pressure: Implications for Composition and Evolution of the Terrestrial Planet Cores **[#1687]**
We conducted experiments in the Fe-C-S system at high pressure. The results on miscibility gap closure and melting temperature have important implications for planetary differentiation and core stratification for small planetary body.

4:30 p.m. Chabot N. L. * Campbell A. J. McDonough W. F. Draper D. S. Agee C. B. Humayun M. Watson H. C. Cottrell E. Saslow S. A.
The Fe-C System at Pressure and Implications for Earth's Core **[#1284]**
Carbon has been suggested as a potential light element in planetary cores. We present experimental data examining the Fe-C system at a pressure of 5 GPa, to investigate how the presence of C would influence the evolution of planetary cores.