

Thursday, March 10, 2011
PLANETARY DIFFERENTIATION: CORES AND MANTLES
8:30 a.m. Waterway Ballroom 6

Chairs: Jie Li
Nachiketa Rai

- 8:30 a.m. Rubie D. C. * O'Brien D. P. Nimmo F. Morbidelli A. Frost D. J. Palme H.
[*Heterogeneous Accretion of the Terrestrial Planets*](#) [#1061]
 A multistage core formation model, that requires the Earth to have accreted heterogeneously, is integrated with N-body accretion simulations to show that the compositions of planetary mantles vary systematically with heliocentric distance.
- 8:45 a.m. Righter K. * Pando K. Humayun M. Danielson L.
[*High Pressure and Temperature Core Formation as an Alternative to the "Late Veneer" Hypothesis*](#) [#2373]
 New high-PT experimental data for highly siderophile elements (HSE) will be combined with published HSE data to show that they can be explained in Earth's mantle by core formation and metal-silicate equilibrium. The late veneer is unlikely to survive this heavy bombardment.
- 9:00 a.m. Li J. * Chen B. Leinenweber K. Wang Y.
[*Rapid Core Formation Through Diapirism from High-Pressure X-Ray Radiography*](#) [#2219]
 High-pressure X-ray radiographs show iron-rich diapir sinking through solid olivine/wadsleyite layer at the rate of thousands of km per million years, supporting diapirism as a viable mechanism for rapid core formation.
- 9:15 a.m. Van Orman J. A. * Hayden L. A.
[*A Model for Trace Element Partitioning in Metallic Systems Containing Multiple Light Elements*](#) [#2367]
 We present a new parameterization for trace element partitioning in iron alloys that fits available experimental data for >20 trace elements in systems containing S, C, and/or P.
- 9:30 a.m. Mikhail S. * Shahar A. Hunt S. A. Jones A. P. Verchovsky A. B.
[*An Experimental Investigation of the Pressure Effect on Stable Isotope Fractionation at High Temperature; Implications for Mantle Processes and Core Formation in Celestial Bodies from 1 GPa and up to 25 GPa*](#) [#1376]
 We show how the stable isotope ratios observed in primary mantle minerals from celestial bodies may not reflect their source composition and how during core formation the depth of equilibration can play a major role in fractionation up to 25 GPa.
- 9:45 a.m. Scott E. R. D. * Goldstein J. I. Yang J.
[*Thermal, Shock, and Impact History of Group IVA and Other Iron Meteorites and Their Parent Asteroids*](#) [#2498]
 From TEM studies of six reheated irons and diverse shock and thermal constraints, we divide IVA irons into four progressive stages of shock and reheating probably caused by destruction of their metallic parent body within 10–20 Ma of CAI formation.
- 10:00 a.m. Chabot N. L. * Humayun M.
[*Exploring the Influence of Oxygen on Partitioning in the Fe-S-O System*](#) [#1590]
 Oxygen is an important "light element" in planetary differentiation processes, but data examining its effect on partitioning are lacking. We present first results from an experimental study to determine the effect of oxygen on partitioning behavior.

- 10:15 a.m. Hillgren V. J. * Ash R. McDonough W. F. Fei Y. Chabot N. L.
[*Solid Metal/Liquid Metal Partitioning of Trace Elements at 14 Gpa*](#) [#2360]
We present the results of a LA-ICPMS study of the solid metal/liquid metal partitioning of a large suite of elements at 14 GPa for metallic liquids with a range of S contents.
- 10:30 a.m. Rai N. * Ghosh S. K. van Westrenen W.
[*Effect of Solid Metal Composition on Solid Metal/Liquid Metal Partitioning of Trace Elements*](#) [#1680]
We present results from experiments in the Fe-S system at pressures between 0.5 and 3 GPa and show that structure of the solid metal has a significant effect on solid metal/ molten metal partitioning of elements.
- 10:45 a.m. Burkemper L. K. * Agee C. B. Garcia K. A.
[*Compositional Effects on Molybdenum Metal-Silicate Partition Coefficients at High Pressure*](#) [#1496]
Molybdenum metal-silicate partition coefficients were calculated from experiments on seven different silicate compositions over a pressure range of 2.5–9.7 GPa and a temperature range of 1585°–2100°C. The implications of the results for core formation are then discussed.
- 11:00 a.m. Colson R. O. *
[*Incompatibility of Ni in Olivine at Low \$fO_2\$ and Consideration of Solubility of Neutral Nickel*](#) [#2491]
New experiments show partition coefficients for Ni between olivine and melt to be less than 1 (incompatible) at temperatures above 1500°C and at low fO_2 . These low partition coefficients are likely related to neutral Ni in the melt.
- 11:15 a.m. Pommier A. * Grove T. L.
[*Investigation of \$H_2O\$ Storage and Hydrous Melting of the Early Martian Mantle*](#) [#1071]
We present the solidus and near-solidus phase relations experiments performed on a water-saturated martian mantle composition using a multi-anvil apparatus ($P = 5\text{--}7$ GPa, $T = 700\text{--}1000$ °C). Results show an important storage capacity of the martian mantle.
- 11:30 a.m. Gardner-Vandy K. G. * Lauretta D. S.
[*Experimental Partial Melting of the MacAlpine Hills 02453 \(CK5\) Chondrite*](#) [#1935]
We perform partial melting experiments of CK chondrite MAC 02453 in a Deltech vertical tube furnace at 1150°C and 1250°C and oxygen fugacities of IW-1 and IW+1. We relate our results to the formation of FeO-rich primitive achondrites.