

## Talk Title (Feb 16, 2018)

### Deep Mantle Composition and Structure: Constraints from Petrology and Rock Physics

#### *Talk Abstract*

Geophysical and geochemical observations indicate anomalous mantle composition and structure in the deep mantle, with an example of the Large Low Shear Velocity Provinces. Previous hypotheses of the compositional differences mainly include: major minerals mode variation, Fe/Mg enhancement of major minerals, H in major minerals and silicate melt. In this talk, the speaker will discuss the petrological model of accessory phases in a bulk silicate rock from three aspects: (1) their role in creating both geophysical and geochemical anomalies; (2) Constraints on the composition and abundance of the accessory phases; (3) Dynamic process leading to the origin, enrichment and preservation of the accessory phases in the mantle from the early Earth to the present day.

#### *Academic Appointment*

Oct 2016 – present Postdoctoral researcher, Institute of Geophysics and Planetary Physics, Scripps Institution of Oceanography, University of California, San Diego.

#### *Education*

Sept 2016, Ph.D., Department of Earth Sciences, University of Minnesota, Twin Cities.

June 2011, M.S., Institute of Geology and Geophysics, Chinese Academy of Sciences.

June 2007, B.S., China University of Geosciences (Beijing).

#### *Research Interests*

Physical and chemical properties of Earth materials under high pressure; Volatile cycling between planetary surfaces and interiors; Mantle composition and structure; Formation and destruction of cratons; Origin of diamonds and kimberlites.

#### *Publications*

**Zhang Z** and Pommier A. (2017) Electrical investigation of metal-olivine systems and application to the deep interior of Mercury. *Journal of Geophysical Research: Planets*, 122.

**Zhang Z**, Dorfman S, Labidi J, Zhang S, Li MM, Manga M, Stixrude L, McDonough W and Williams Q (2016). Primordial metallic melt in the deep mantle. *Geophysical Research Letters* 43, 3693–3699.

**Zhang Z** and Hirschmann M. (2016) Experimental constraints on mantle sulfide melting up to 8 GPa. *American Mineralogist* 101, 181–192.

**Zhang Z**, Lentsch N and Hirschmann M. (2015) Sulfide melting in carbon-saturated conditions in the lithosphere. *Contributions to Mineralogy and Petrology* 170, 47.

**Zhang Z**, Zhang HF, Shao JA, Ying JF, Yang YH and Santosh M. (2014) Mantle upwelling during Permian to Triassic in the northern margin of the North China Craton: Constraints from southern Inner Mongolia. *Journal of Asian Earth Sciences* 79, 122-129.

**Zhang Z**, Zhang HF, Shao JA, Ying JF, Yang YH and Santosh M. (2012) Guangtoushan granites and their enclaves: Implications for Triassic mantle upwelling in the northern margin of the North China Craton. *Lithos* 149, 174-187.

**Zhang Z**, Hastings P, von der Handt A, and Hirschmann M. (2018) Experimental determination of carbon solubility in Fe-Ni-S melts under upper mantle conditions (accepted in *Geochimica et Cosmochimica Acta*).

**Zhang Z**, von der Handt A, and Hirschmann M. (2018) Experimental determination of Fe-Ni distribution between olivine and sulfide liquid: implications for mantle sulfide composition. (accepted in *Contributions to Mineralogy and Petrology*)