# Martian Core Heat Flux: Electrical Resistivity and Thermal Conductivity of Liquid Fe at Martian Core P-T Conditions

*Innocent Ezenwa[1], Takashi Yoshino[1]

1. Institute for Planetary Materials, Okayama University

The cores of the rocky planetary bodies are mainly Fe in composition, thus, the understanding of the transport properties of Fe at their core pressure and temperature conditions is important in understanding their core dynamics. Through the on-going InSight mission on Mars, an in-depth understanding of the Martian interior and dynamics can be made through acquired seismic and heat probe data. However, the heat probe (Heat Flow and Physical Properties Package : *HP*$^3$*)* can only penetrate up to a distance of 5m into Martian crust, hence, to better complement the heat flow data, electrical resistivity measurement of Fe up to Martian core and derived thermal conductivity values are highly needed. Although attempts has been made in investigating the electrical resistivity of Fe at high pressure conditions in multi-anvil, existing data varies over a wide margin. We investigated the electrical resistivity of solid and liquid Fe sample devoid of contamination up to Martian core pressure and derive thermal conductivity from our data using Wiedemann Franz' s law with the Sommerfeld value of Lorenz function. All the three phases of Fe at various pressure and temperature conditions were clearly identified. Our results suggests that the electrical resistivity of Fe at Martian core conditions is not as high as some recent studies have suggested. Since our recovered samples have no trace of impurity, our data sets provide the highly needed data for constraining the upper bound of the electrical resistivity, thermal conductivity and heat flux from Martian core. This will complement the on-going measurement by *HP*$^3$ on Mars.

Keywords: Martian Core Heat Flux, Electrical Resistivity of Fe, Thermal Conductivity of Fe

 