学术报告

题　目： **Research at High Pressures with Diamond Anvilcells: Implications For Planetary Interiors, To Quantum Phenomena In Dense Systems and Synthesis of Novel Materials**

报告人： **Alexander Goncharov**

中科院外专“千人计划”特聘研究员

时　间： **2015 年 12 月 21 日(周一)下午 14:40**

地　点： **中科院固体所新楼 520 会议室**

Abstract:

Prof. Goncharov will present an overview of recent developments in diamond anvil cell (DAC) research aiming better understanding of planetary interiors, physics and chemistry of materials at extreme conditions, and synthesis of materials with extraordinary properties for new technologies. Diamond anvil cells are currently a well developed technique to reach pressures beyond 300 GPa at variable temperatures, and this method is compatible with a number of material state and property probes. He will report a progress of achieving ultrahigh pressures approaching 1 TPa using a double stage diamond anvil technique. A pulsed laser heating technique allows measurements of structural and optical properties of materials at P-T conditions exceeding 200 GPa and 10,000 K thus enabling probing materials at P-T conditions of the planetary interiors. The use of ultrafast laser sources enables a number of new single-shot and pump-probe dynamic and static compression experiments. He will present new data on ultrafast compression of statically precompressed up to 55 GPa deuterium, optical properties of hydrogen up to 140 GPa and 3000 K, and thermal conductivity measurements of Fe under the Earth’s core conditions. Chemistry rules change with pressure making more stable materials with modified chemical bonding (polymerized, higher hybridized, electronically localized, and dynamic states) and varied stoichiometry. This will be illustrated on examples of new chlorides and hydrides and other materials synthesized under high pressures and other materials. He will also report on the study of high-pressure chemistry in the H-S system that has been recently shown to reveal superconductivity at >200 K. Finally, he will outline the future experiments utilizing the latest achievements in fast laser techniques to elucidate a putative behavior of hydrogen at the transition to metallic and superconducting state.