Superconductivity in elements under very high pressure

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【Outline of survey】

The purpose of this research is to obtain the guideline of material design for "Room-Temperature Superconductivity." We aim to understand the fundamental mechanism and capability of “superconductivity” systematically by development of technology of very-high-pressure generating and measuring. We believe there is a key for understanding of the mechanism of general "superconductivity." The typical feature of this research is in the following three points. 1. Substance is confined only to the element and is studied up to extreme condition. 2. The electronic and crystal structure are investigated by using a big synchrotron resource (SPring-8). 3. Research is carried out through close cooperation with theoretical calculations.

【Expected results】

The result will give the help for understanding the superconductivity phenomenon in other known or unknown superconducting compounds, and it lead us to possible discovery of higher-temperature superconductivity. For example, if the metallic hydrogen becomes reality, it means “room temperature superconductivity” is realized. The research towards the realization under ambient pressure would be suddenly accelerated. Thus, the results of this research do not only obtain scientific and fundamental knowledge, but have big influence in energy, communication, and electronics, etc. for human beings in future.

【References by the principal investigator】

- K. Shimizu, K. Amaya and N. Suzuki: “Pressure-Induced Superconductivity in Elemental Materials”, J. Phys. Soc. Jpn. 74 (2005)1345-1357.
- K. Shimizu, D. Takao, S. Furomoto and K. Amaya: “Pressure induced superconductivity in Li and Fe”, Physica C 408-10 (2004) 750-753.

【Term of project】 FY2007－2011	【Budget allocation】 41,900,000 yen (2007 direct cost)

【Homepage address】 http://www.hpr.cqst.osaka-u.ac.jp