

Collaborative Research Visit to Advanced Solid-State Laboratory, ICR, Kyoto University

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Many thanks are extended to Professor Yuichi Shimakawa, The Advanced Solid-State Laboratory, and the ICR for hosting and funding the ICR joint usage project “High pressure synthesis of new Rh based quantum materials”. This project further strengthens the fruitful collaboration built up over many years between the Shimakawa and Attfield groups.

The relatively modest stay of 7 weeks was sufficient to exceed the original aims of the project, which called for the synthesis of new compounds $\text{Ho}_2\text{Rh}_2\text{O}_7$ and PbRhO_3 . Due to world class synthesis capabilities and expertise within the Shimakawa lab, 28 syntheses were attempted of $\text{Ln}_2\text{Rh}_2\text{O}_7$ ($\text{Ln} = \text{Pr} \sim \text{Yb}$) compounds. This allowed us to effectively map the synthesis space of this attractive class of novel quantum materials. Six new compounds, $\text{Ln}_2\text{Rh}_2\text{O}_7$ ($\text{Ln} = \text{Tb}, \text{Dy}, \text{Ho}, \text{Er}, \text{Tm}, \text{Yb}$) were synthesised and initially characterised using the “Infinite” DIA cubic anvil press, Bruker D8 diffractometer, and QD MPMS3 SQUID available within the ICR. Further experiments have already been undertaken in collaboration with the European Synchrotron Radiation Facility, and within the University of Edinburgh, beamtime proposals have also been submitted to the ISIS spallation source, UK. This new class of materials holds promise to have a high impact in the field of quantum magnetic materials.

Having been a previous PDRA of the Shimakawa lab this time offered me opportunities to further foster connection and friendship, I was able to meet Professor Patrick Woodward: a visiting professor and one of my PhD examiners, Tan Zhenhong: a previous student of Professor Shimakawa who currently is a member of the China Spallation Neutron Source and other group members. This stay also coincided with the AIRAPT-29 conference held in Matsuyama, here I was able to present a talk showing research results from a previous research project undertaken with Professor Shimakawa to an international audience and to form connections with other Japanese researchers. Beyond the research outcomes the time in Kyoto was precious and cherished, there were many opportunities for connections to be built outside of work, with dinners and events hosted by the Shimakawa laboratory, any times to enjoy Japanese food and culture are particularly valuable.

I acknowledge the kind and generous funding provided by the ICR for this research project, I extend my warm and heartfelt thanks to Professor Shimakawa and all members of his research group for their hospitality and assistance. I look forward to any further opportunities to continue collaborating in the future, both as a member of the Attfield group and hopefully as an independent researcher.



Upper: Visiting Izakaya restaurant near Kyoto Station



Right: “Infinite” DIA cubic anvil press