

第190回エンレイソウの会

場 所： 北海道大学工学部A棟 A1-17（大会議室）

日 時： 2013年7月22日（月曜日） 16:30-17:30

講演者： **Dr. Ljupka Stojcevska**

(Complex Matter Department, Jozef Stefan Institute, Slovenia)

題 目： 『 **Real-time observations of the quasi-particle relaxation dynamics in various complex systems by means of femtosecond laser spectroscopy** 』

要 旨： We have performed systematic study of the quasiparticle relaxation dynamics in various complex systems such as cuprates, iron-based pnictides superconductors and charge-density wave systems.

In undoped iron-based pnictides, exhibiting a spin-density wave (SDW) ordering, we observe a bottleneck associated with a partial charge-gap opening. Similarly as in the previous reported studies, a single relaxation process is observed, showing a remarkable critical slowing down of the quasiparticle (QP) relaxation dynamics at the SDW transition temperature. On the other hand, in the optimally doped crystals, a multiple relaxation processes are present with distinct SC-state quasiparticle recombination dynamics exhibiting a BCS-like T-dependent superconducting gap, and a pseudogap (PG)-like feature at higher temperatures. In all optimally doped cuprates and iron-based pnictides, we observe a saturation of the superconducting relaxation component. By taking into account the optical constants such as penetration depth and reflectivity we can accurately calculate energy needed for destruction of the superconducting state. If we compare the magnitudes of the destruction and condensation energies we notice a significant discrepancy in cuprates and iron-based pnictides, which can be explained with a phonon-mediated QP bottleneck mechanism. In contrast, in the charge-density wave systems, the destruction is faster and electronic; therefore it can not be explained in the frame of the proposed QP bottleneck mechanism.

The second moment of the Eliashberg function, obtained from the relaxation rate in the metallic state at higher temperatures, has similar values in different iron-based pnictides, which indicates a moderate electron phonon coupling.

More recently we have observed a switching between an equilibrium state to a metastable in 1T-TaS₂ charge-density wave system by means of ultrafast laser quench through a symmetry breaking transition. The switching is repeatable and accompanied with a change in reflectivity and DC resistance, opening a new possibility for ultrafast non-volatile memory devices.

世話人： 戸田 泰則

北海道大学大学院工学研究院応用物理学部門

e-mail: toda@eng.hokudai.ac.jp

★エンレイソウの会連絡先

北海道大学大学院工学研究院応用物理学部門 松浦徹

TEL : 011-706-7818 Email: toru@eng.hokudai.ac.jp