博士論文公聴会の公示(物理学専攻)

学位申請者：**Nguyen Ngoc Phuong**

論文題目　：**Study on Charge Transfer Dynamics of a Photocatalyst Material by Time-Resolved Terahertz Spectroscopy**
(時間分解テラヘルツ分光法を用いた光触媒物質の電荷輸送ダイナミクスの研究)

日時：2019 年　2 月　6　日　(火) 8:50-10:20

場所：理学研究科 H 棟　階セミナー室 (H701　号室)

主査：木村真一
副査：松野丈夫，兼松泰男，渡辺純二，渡邊浩，芦田昌明（基礎工）

論文要旨：

The human being is facing energy and environment issues such as depletion of energy sources and high concentration of CO_2 in the air. Artificial photosynthesis is one of the solutions to solve these problems. In artificial photosynthesis materials such as Re(I) carbonyl diamine complex,　the intermolecular interaction plays a crucial role for the photocatalytic activity. Here, I have investigated the photo-induced relaxation dynamics and reductive quenching process of the photo-excited state on a typical Re complex $[Re(CO)_2(bpy)\{P(OEt)_3\}_2](PF_6)$ in 2,2',2"-nitrilotriethanol (TEOA) solvent as an electron donor, by using time-resolved attenuated total reflection spectroscopy in the terahertz (THz) region. The intermolecular vibrational mode between the complex and TEOA molecules at 1.35 THz shows a three-step relaxation process in a picosecond timescale after photo-excitation, where firstly the triplet metal-to-ligand charge transfer excited state is vibrationally cooled down, secondly the distance between Re and TEOA is reduced by the rotation of TEOA molecules due to dipole-dipole interaction accelerated by heat transfer, and finally electrons transfer from TEOA to Re. These observations provide us the insight into the electron transfer process of photocatalytic properties of $[Re(CO)_2(bpy)\{P(OEt)_3\}_2](PF_6)$ in solvents.