

公益信託 分子科学研究奨励森野基金  
平成27年度 招聘外国人研究者 森野レクチャー

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題目：Catalysis in Real Time;  
New Opportunities with X-ray Lasers

日時：2015年11月5日木曜日16:00～

場所：東京大学理学部 化学教室本館 5階講堂

参加費：無料

#### 講演要旨

Nearly all of the chemical processes involved in energy conversion or in chemical industry utilize catalytic chemical transformations at interfaces between solids and liquids or gases. While most of our existing understanding is based on a static view of reactions at interfaces, the development of x-ray lasers opens up the dynamic regime where studies of the reaction mechanism to observe transformations on timescales down to femtoseconds becomes possible. I will here present how we can study chemical reactions on surfaces using X-ray free-electron lasers from recent work at the Linac Coherent Light Source, or LCLS, at SLAC National Accelerator Laboratory. We induced the hot electron and phonon mediated excitation of adsorbates on Ru(0001) with synchronized excitation by a femtosecond optical laser pulse. We have followed the ultrafast evolution of the bond distortions, weakening and breaking, using x-ray absorption spectroscopy (XAS) and x-ray emission spectroscopy (XES) resonantly tuned to the oxygen core level with ultrashort x-ray pulses delivered from LCLS. Thereby directly follow the time evolution of the molecular orbitals in an atom-specific way on a subpicosecond timescale. Four examples will be shown CO desorption, Oxygen activation, CO oxidation and CO hydrogenation on Ru(0001). I will demonstrate that both transient intermediates and the transition state regions can be detected in surface chemical reactions.

- ・講演後、Nilsson教授を囲んで本郷キャンパス・医学部教育研究棟13F「カポ・ペリカーノ」(<http://www.capo-p.com/access.html>)で懇親会を行う予定です(無料)。
- ・講演会・懇親会に参加ご希望の方は、人数把握のために世話人までご連絡ください。

世話人：吉信淳(東京大学物性研究所: [yoshinobu@issp.u-tokyo.ac.jp](mailto:yoshinobu@issp.u-tokyo.ac.jp))

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