環境共生学科／環境科学研究センター共催
講演会2013

2013年5月10日〔金〕 開演14:40
総合研究棟1階　シアター教室

講演1：14:40-15:25（講演30分、質疑応答15分）

Dr. Kyung Hwan Kim（韓国科学技術研究院）

「Traffic related air pollution research using a mobile laboratory in Seoul, Korea」

講演2：15:30-17:00（講演60分、質疑応答30分）

Prof. Detlev Möller（コトブス工科大学）

「Results from 20 years (1992-2012) studies in atmospheric chemistry and air pollution control: From tipping point chemistry to climate control」

講演後は3階自習室において両先生とご歓談頂けます！

Saitama University
埼玉大学

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関口和彦（環境共生学科 ext. 5739）

Results from 20 years (1992-2012) studies in atmospheric chemistry and air pollution control: From tipping point chemistry to climate control

Detlev Möller

Working Group Atmospheric Chemistry and Air Pollution Control
Brandenburg Technical University Cottbus (BTU)

After the German unification, Detlev Möller´s working group from the former Academy of Sciences first has been established belong the Fraunhofer Society and since 2005 at the Technical University Cottbus, permanent on the scientific campus in Berlin-Adlershof. At all, there are experiences in air chemistry from 1975. Before 1990, the "classical" pollution by SO_2, NO_x and NH_3 including precipitation chemistry and modelling wet deposition was in the focus. Having the first extensive aqueous-phase chemistry model in Europe, we started in 1990 with cloud chemistry modelling, following by the 18-years Mt. Brocken cloud chemistry monitoring programme (1992-2010). Many intensive field campaigns, mostly within international cooperation have been carried out between 1992 and 2005 in the focus of oxidant and multiphase chemistry. Our scientific highlights are listed in following:

1992	model evidence of O_3 removal in polluted clouds
1995	experimental evidence of O_3 removal in clouds
1997	algorithm to reduce automatically complex chemical mechanisms
1998	explanation of the H_2O_2 increase in Greenland ice cores by SO_2 abatement
1999	worldwide first quality control of a mobile ozone lidar
1999	effective fog removal through dry ice blasting (patent)
2000	evidence of HNO_2 formation in clouds
2002	evidence of day-time HNO_2 formation on wet surfaces
2002	idea to remove warm fog through water ice blasting (patent)
2003	evidence of acidification of urban aerosol (PM_{10})
2003	closing the 20-years precipitation chemistry monitoring in Seehausen
2005	idea on photocatalytic air and water treatment (patent)
2009	closing the studies on photokatalytic HNO_2 formation
2009	idea on ultrasonic initiated CO_2 desorption from aqueous amine solutions
2010	closing the works on H_2O_2 multiphase chemistry
2010	closing the Mt. Brocken cloud chemistry monitoring (1992-2010)
2010	idea of the SONNE conception: the global CO_2 economy
2011	cleansing real waste waters by photocatalytic ozonation

The lecture will highlight and summaries our results from aqueous-phase, ozone and aerosol chemistry based on our long-term precipitations and cloud chemistry monitoring and more than 30 large field campaigns. Interfacial chemistry with special emphasis on photo-catalysis to derive tipping points for photo-oxidants (OH and HO_2 family) is highlighted. Several examples for O_xH_y and NO_y aqueous interfacial chemistry with respect of changing emissions will be given. We conducted several measurement campaigns at different European sites (urban, rural, mountain) to study the timely variation of nitrous acid (together with many other species of interest). Through bridging air chemistry with air pollution and climate change some conclusions toward "sustainable" chemistry will be presented.

Traffic related air pollution research using a mobile laboratory in Seoul, Korea

Kyung Hwan Kim

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Our research team has focused on research fields related to motor vehicle exhausts in Seoul area using a mobile laboratory since 2004. Most of studies have focused on the exposure levels of particulate matter (PM) and other related gaseous pollutants. In this lecture, we will explore the pollution levels of normal or specific on-road environment with the aspect of human exposure. Normal on-road environment includes different districts in Seoul Metropolitan while specific on-road environment includes narrowed environment such as a cabin indoor, childcare facilities, tunnels, and intersection of roadways. First, the overall trend of PM concentrations and regulations will be introduced with the emission sources in Seoul. Second, the examples of air pollutants levels within specific on-road environment will be discussed. Third, dilution and dispersion of air pollutants emitted from motor vehicles in a micro (a few meters), meso (a few hundred meters), and macro (a few kilometers) scales will be presented. Furthermore, results from the recent studies related to carbonaceous component in ultrafine particles (UFPs) and fine particles (FPs) at roadside environment of Seoul and Saitama will be discussed. In brief, OC1 and EC2 fractions in UFPs and FPs showed a relationship with total particle number concentrations ($5.6 < D_p < 560$ nm) at roadside while other fractions did not display such a relationship possibly indicating that OC1 and EC2 fractions are the main components for the measured particle number concentrations. This observation may indicate that the UFPs emitted from motor vehicles mainly consist of EC2, which can be a core of UFPs and provide surface area for semi-volatile component, with OC1 that can be condensed onto existing or newly formed particles. Carbon fractions in UFPs at roadside fairly correlated with black carbon (BC), particle-bound PAHs, and NO_x especially during the daytime, supporting they are mainly emitted from motor vehicles.