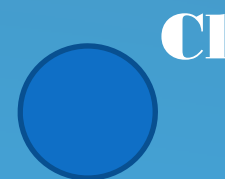
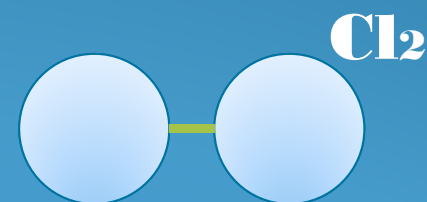


May 16, 2011





國家同步輻射研究中心

National Synchrotron Radiation Research Center



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電子郵件：liu.cl@nsrrc.org.tw

學

歷：

- 清華大學化學系/中央研究院國際研究生學程物理化學博士(2004年9月~2008年2月)
- 交通大學應化系物理化學碩士(1999年9月~2001年6月)
- 交通大學應化系化學學士(1995年9月~1999年6月)

經

歷：

- 國家同步輻射研究中心助研究員 (2010年7月~迄今)
- 柏克萊大學化學系；勞倫斯柏克萊國家實驗室Advanced Light Source博士後研究 (2008年5月~2010年6月)
- 中研院原分所 博士後研究 (2008年2月~2008年4月)
- 中研院原分所 研究助理 (2002年1月~2006年12月)

Outline

- Overview of aerosol experiments.
- Cl + Squalane aerosol.
- New aerosol orthogonal acceleration TOF MS.
- Uncompleted experiments:
 - Heterogeneous reaction between gas-phase Cl_2 and aerosol composed of C-C double bonded molecules.
 - Heterogeneous reactions between Cl radicals and aerosol composed of C-C double bonded molecules.
- Future works...

Overview



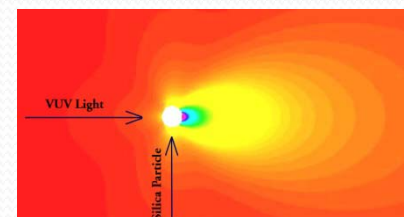
Sheath Air

Excess Air

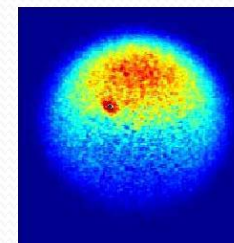
Mass Analyzer
Particle Counter

VUV Analysis (7-25 eV)

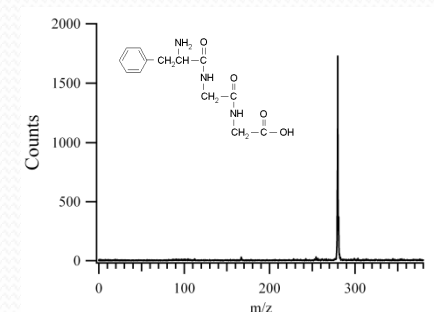
Photon Scattering



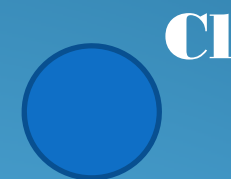
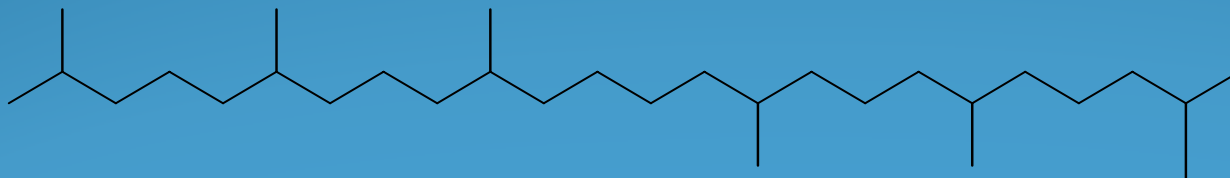
Photoelectron Imaging



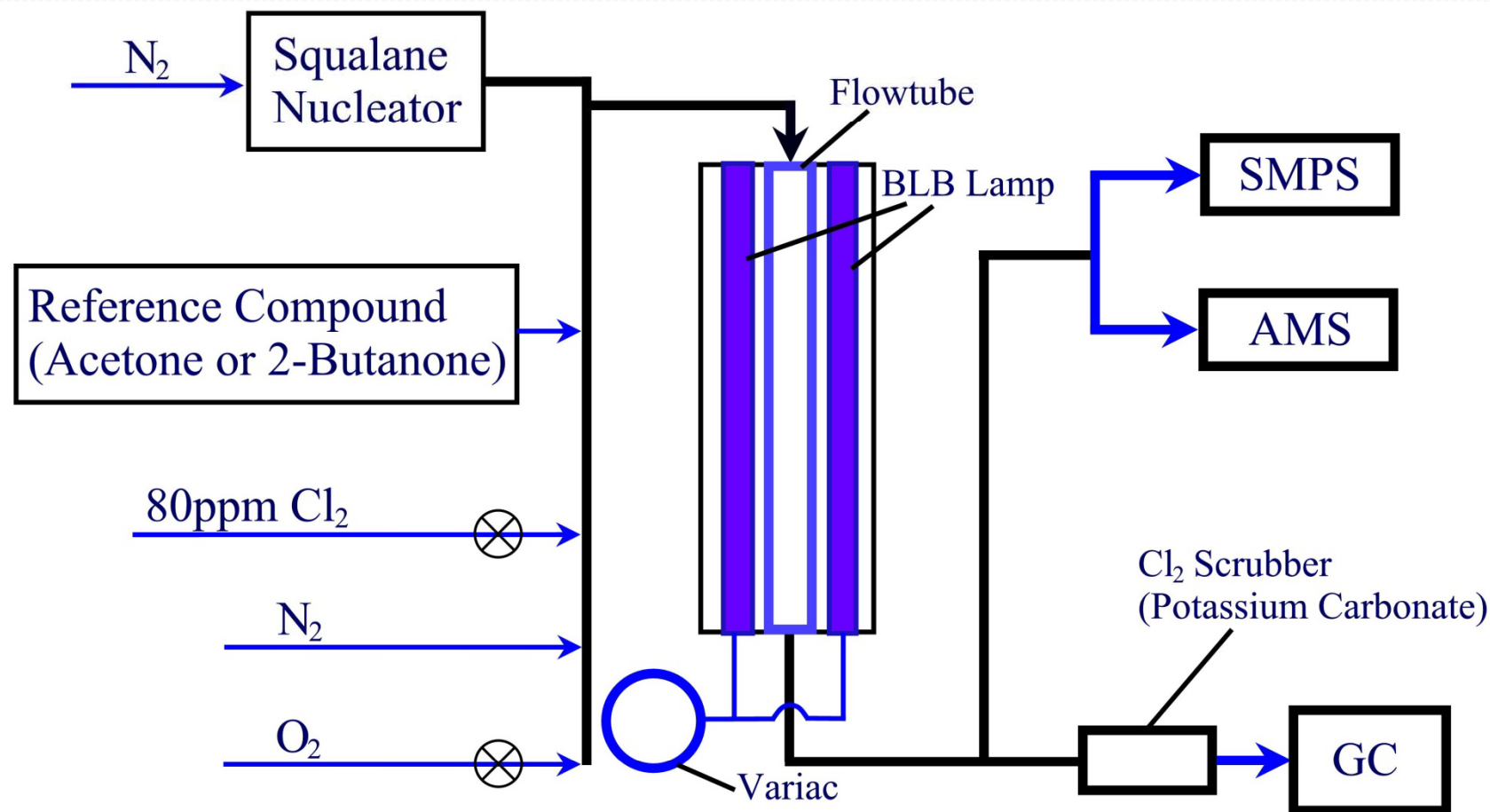
Mass Spectrometry



Cl + Squalane

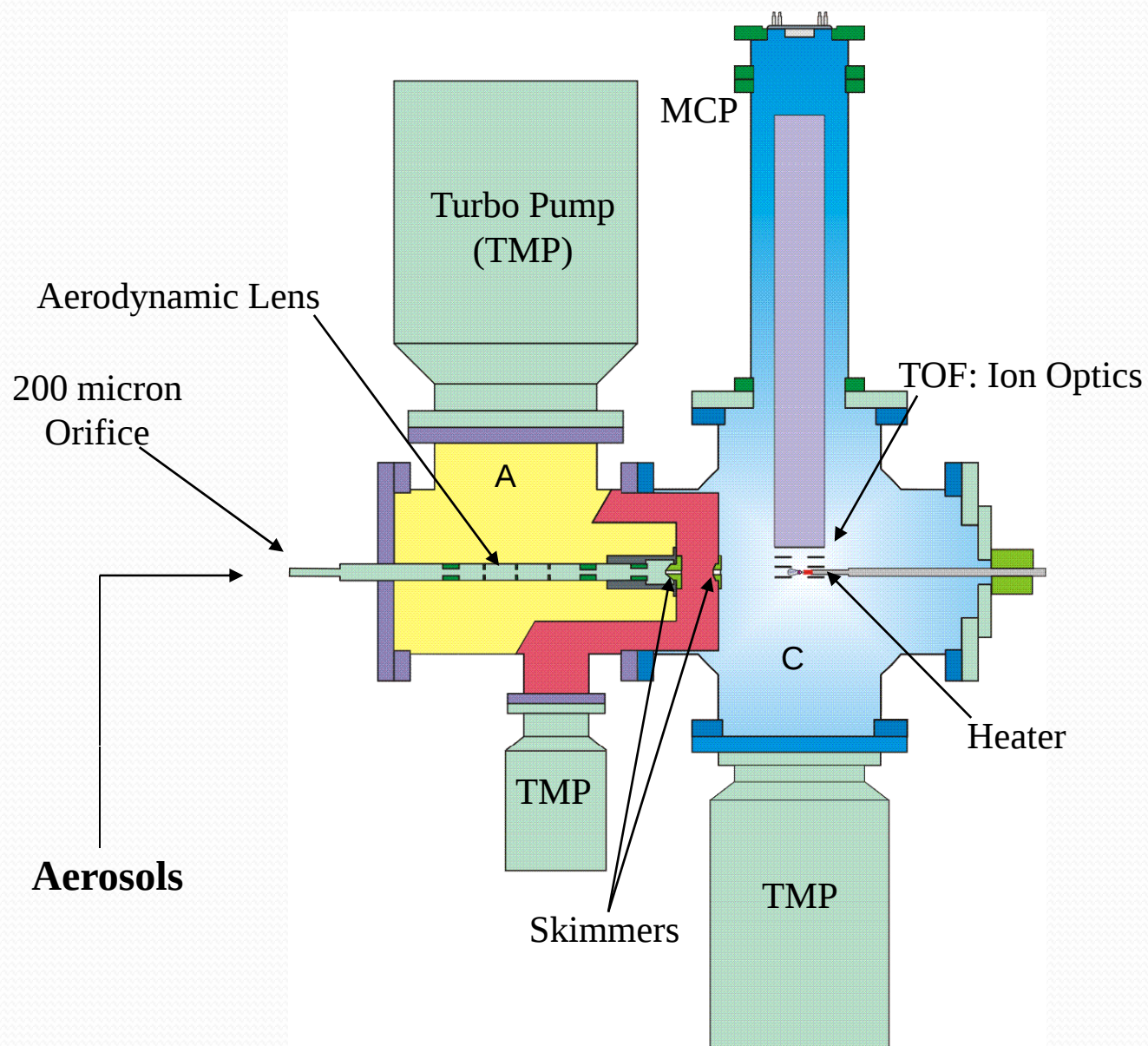


Experimental Setup

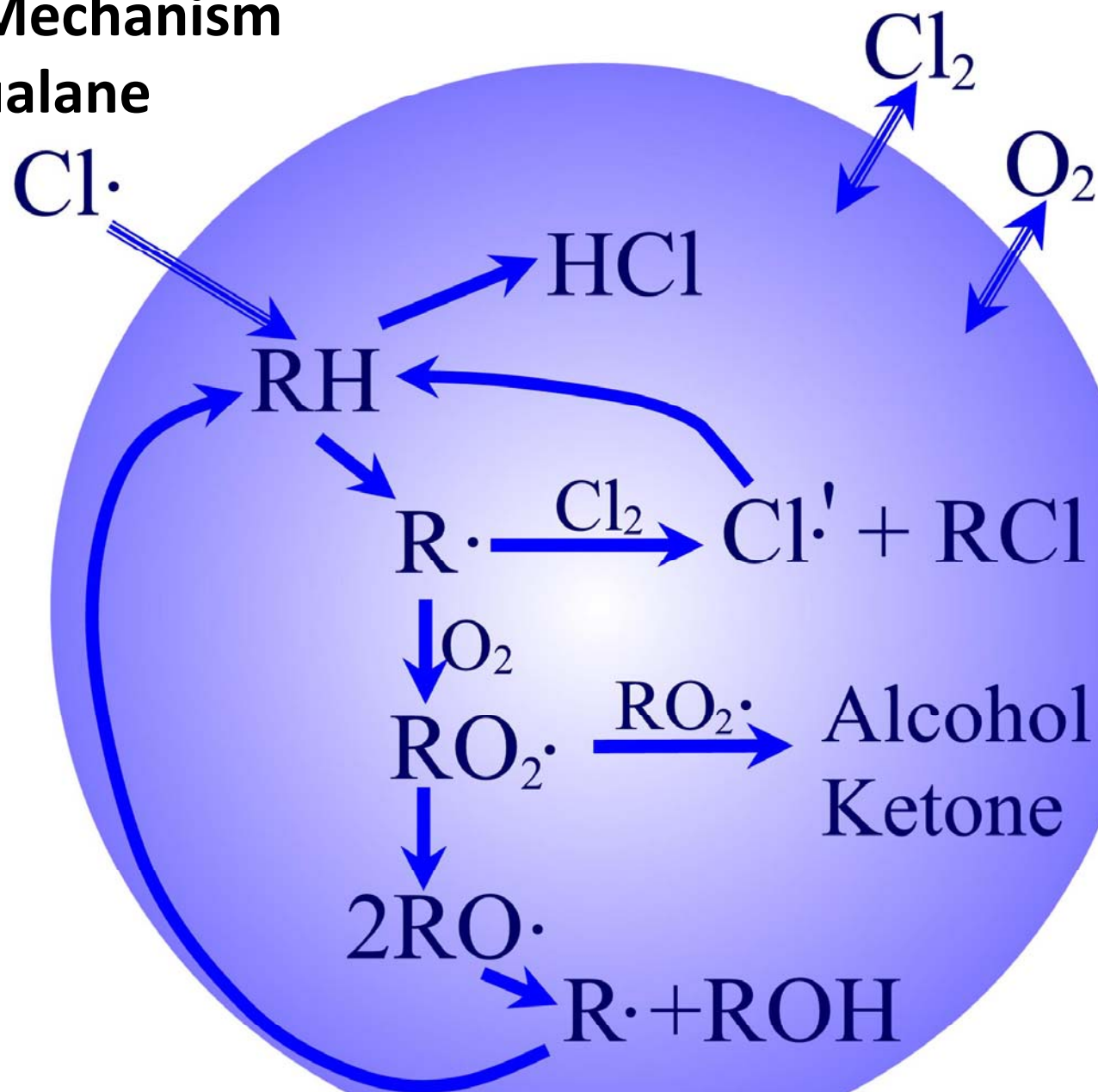


- Photon flux can be varied by variac and lamp tube amount to change the Cl Exposure.

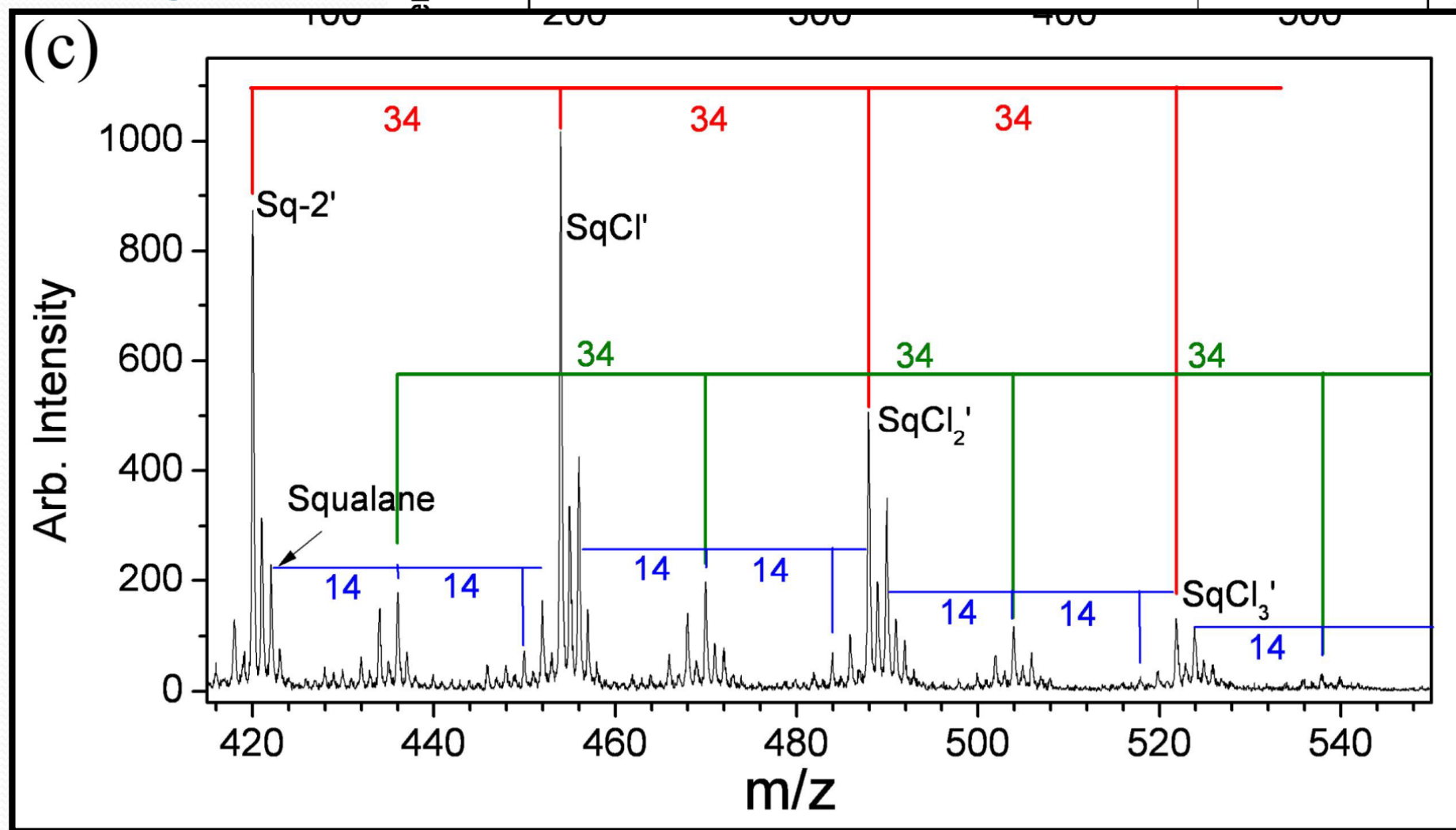
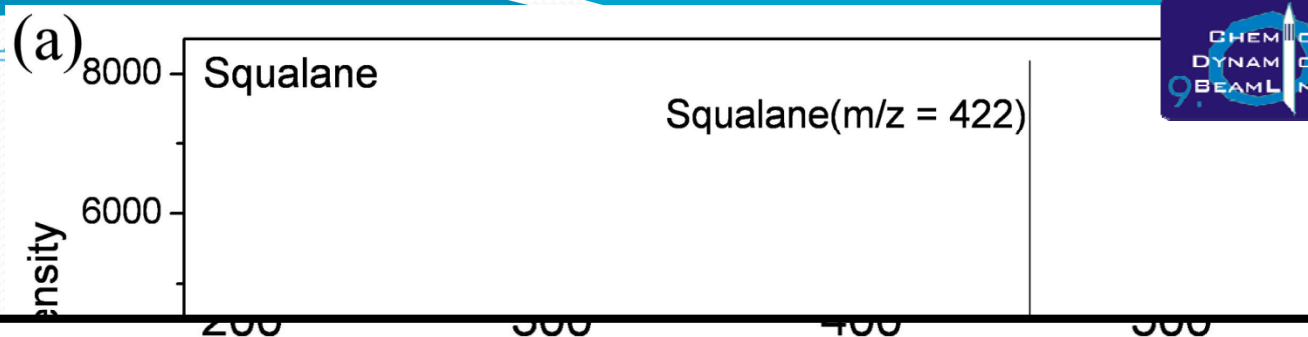
Aerosol Mass Spectrometer(AMS)



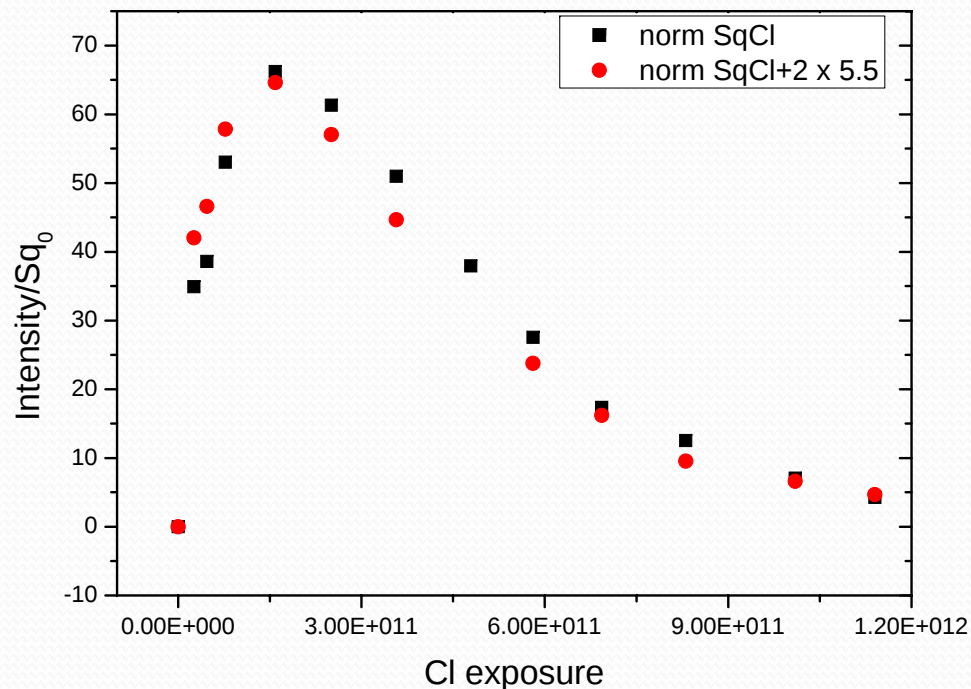
Reaction Mechanism of Cl + Squalane



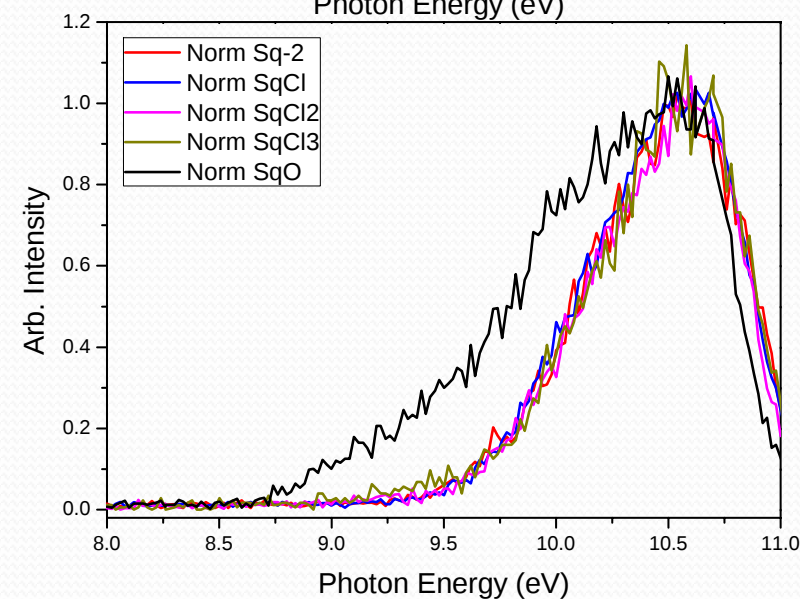
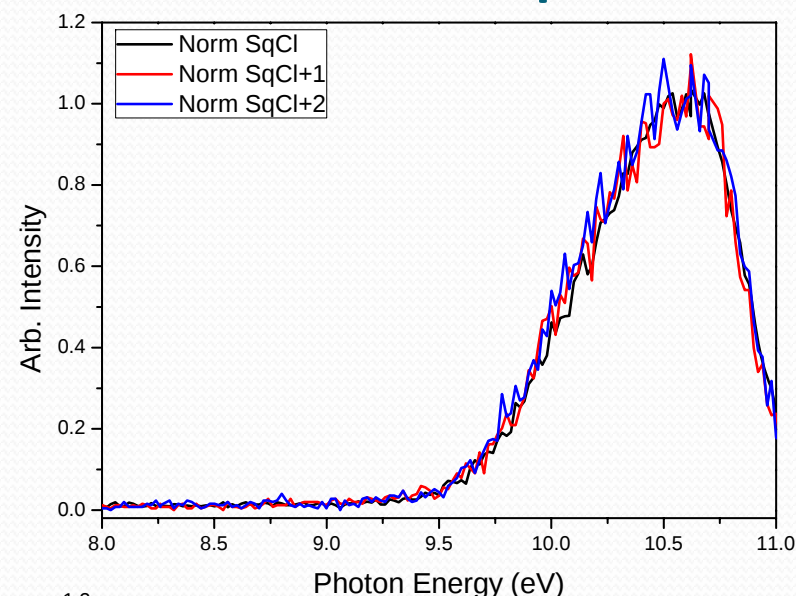
MS

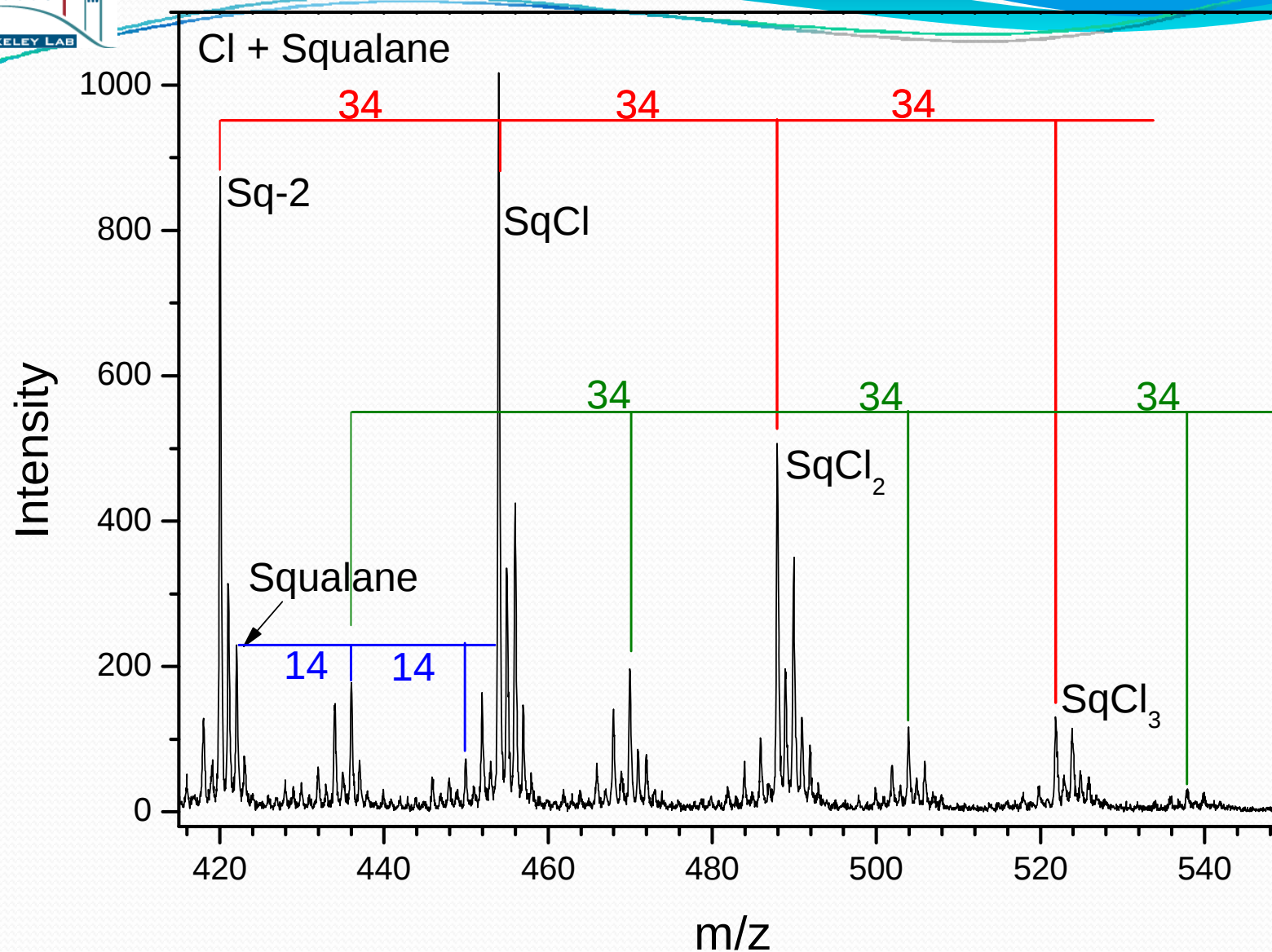


The evolutions and PIE curves of other products



From this evolution, the peaks after SqCl are from the isotopes of ^{13}C and ^{37}Cl .

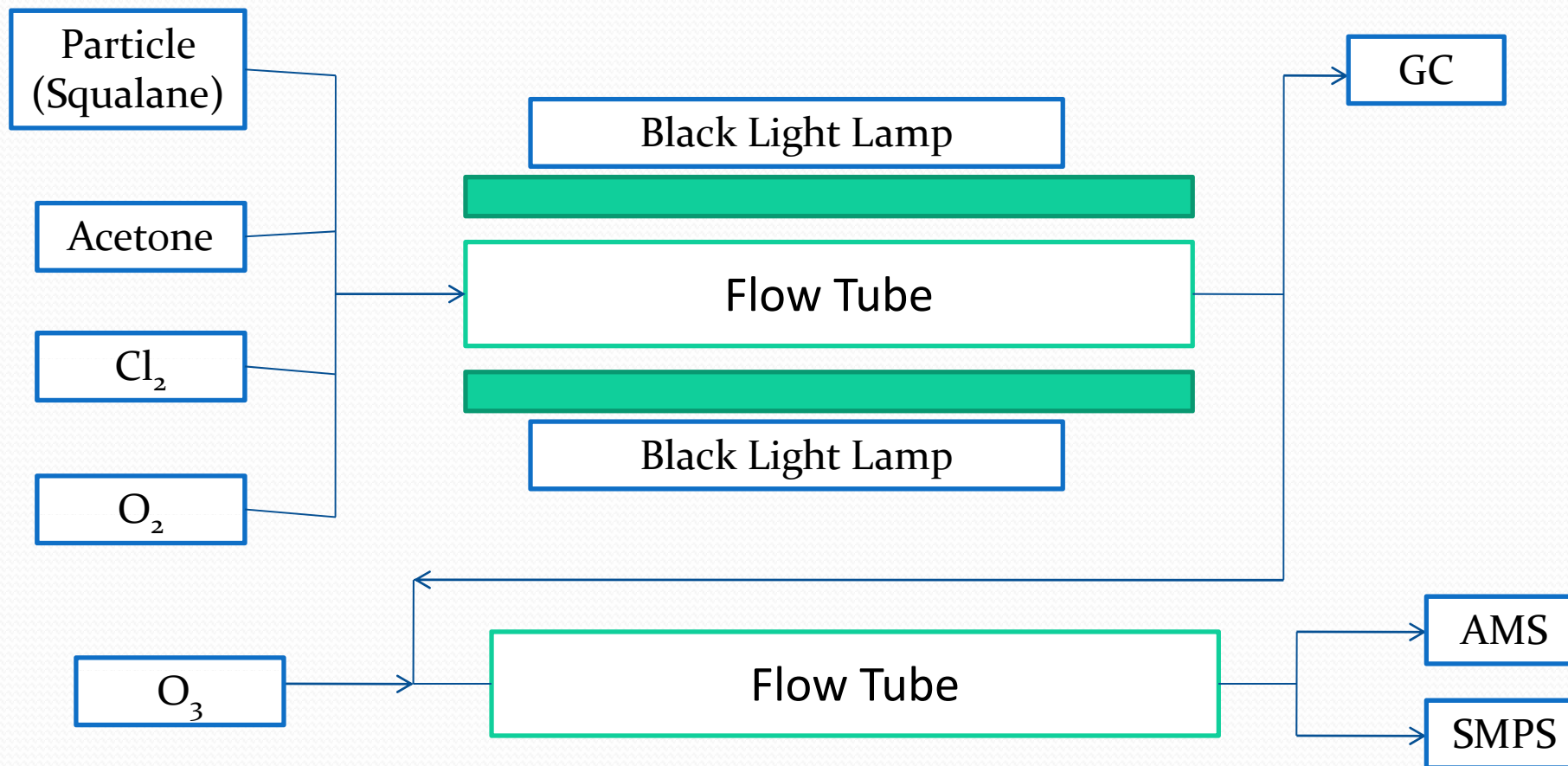




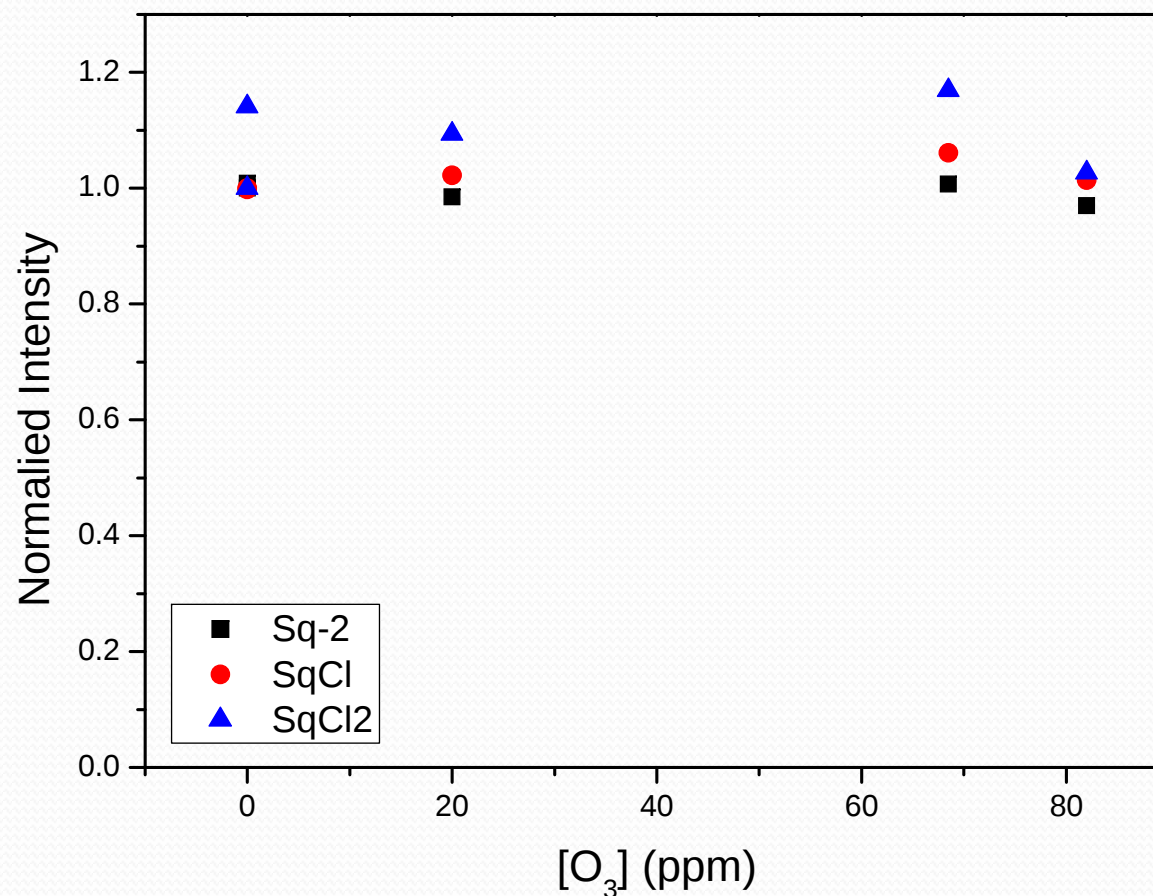
From the TOF MS, the first product is Sq-2 and the second one is SqCl,...etc. The SqO, SqClO,... might be also from Sq and SqO..., respectively.



Experimental Setup to check if the products are alkene

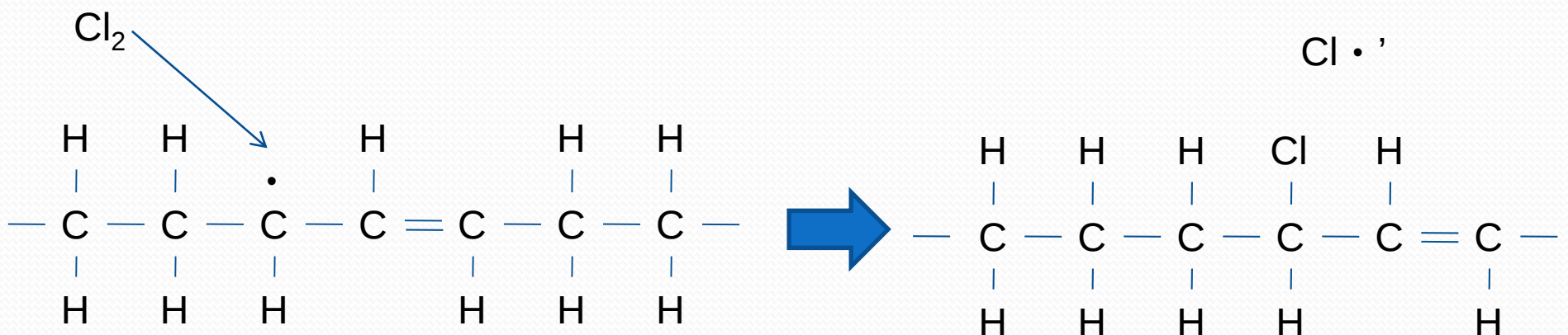
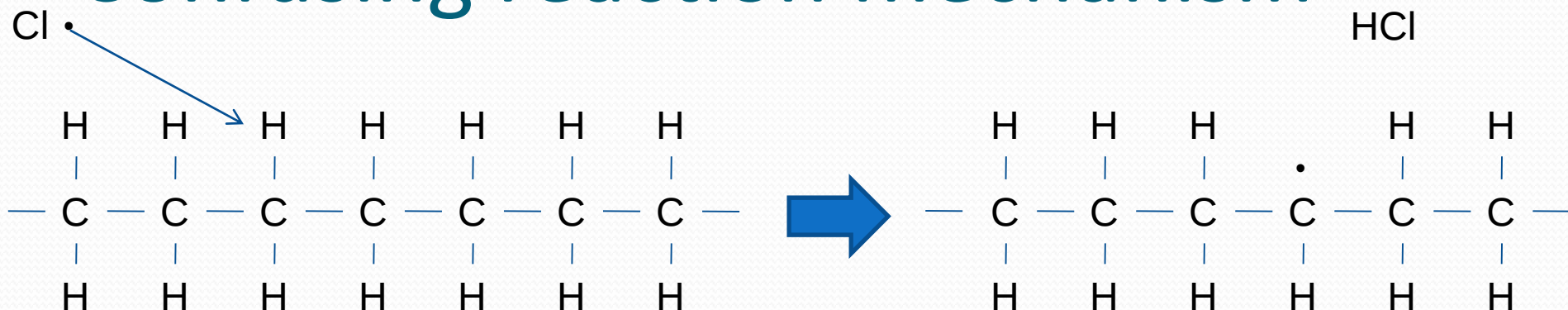


The Results of O₃ checking

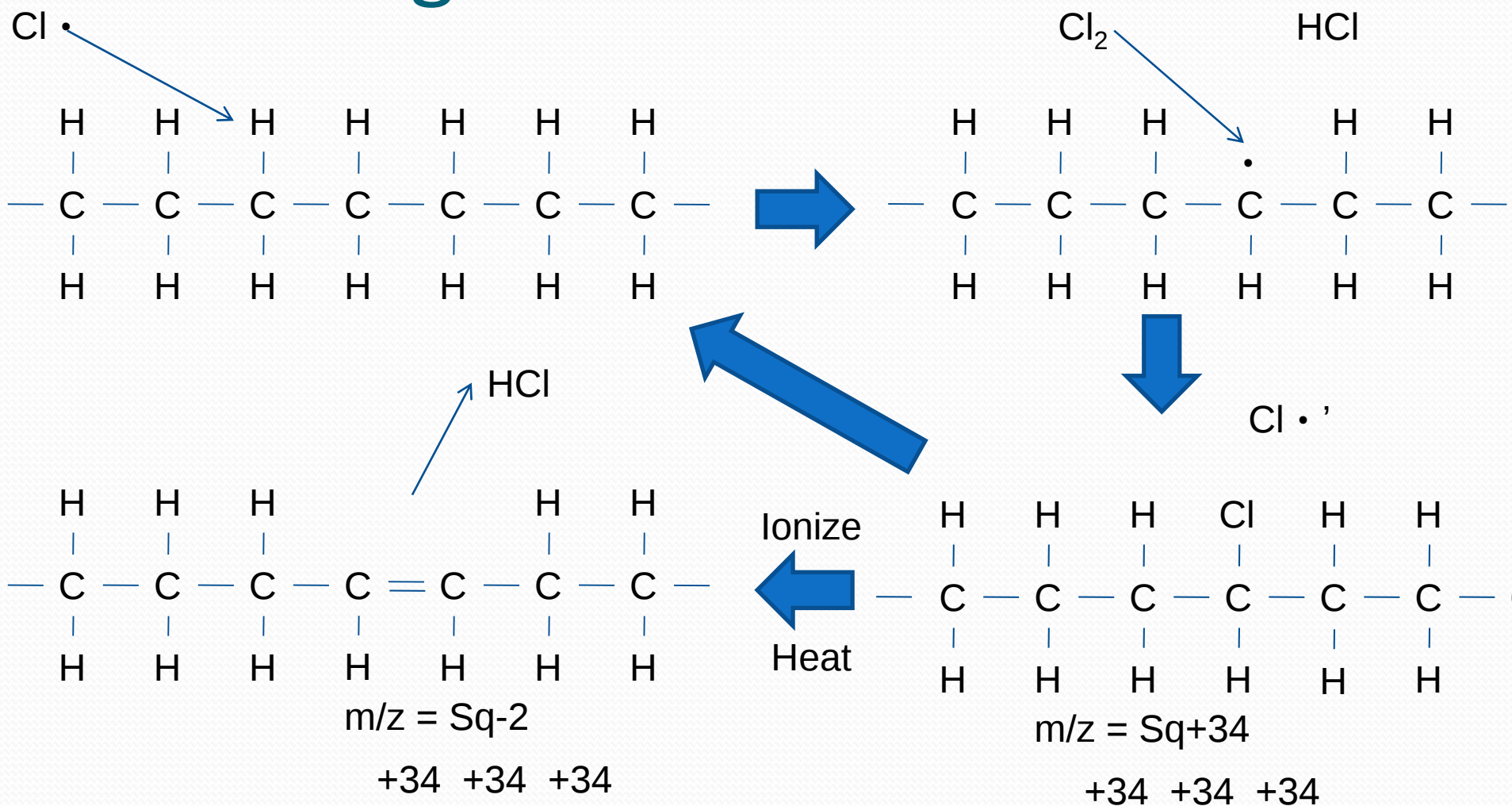


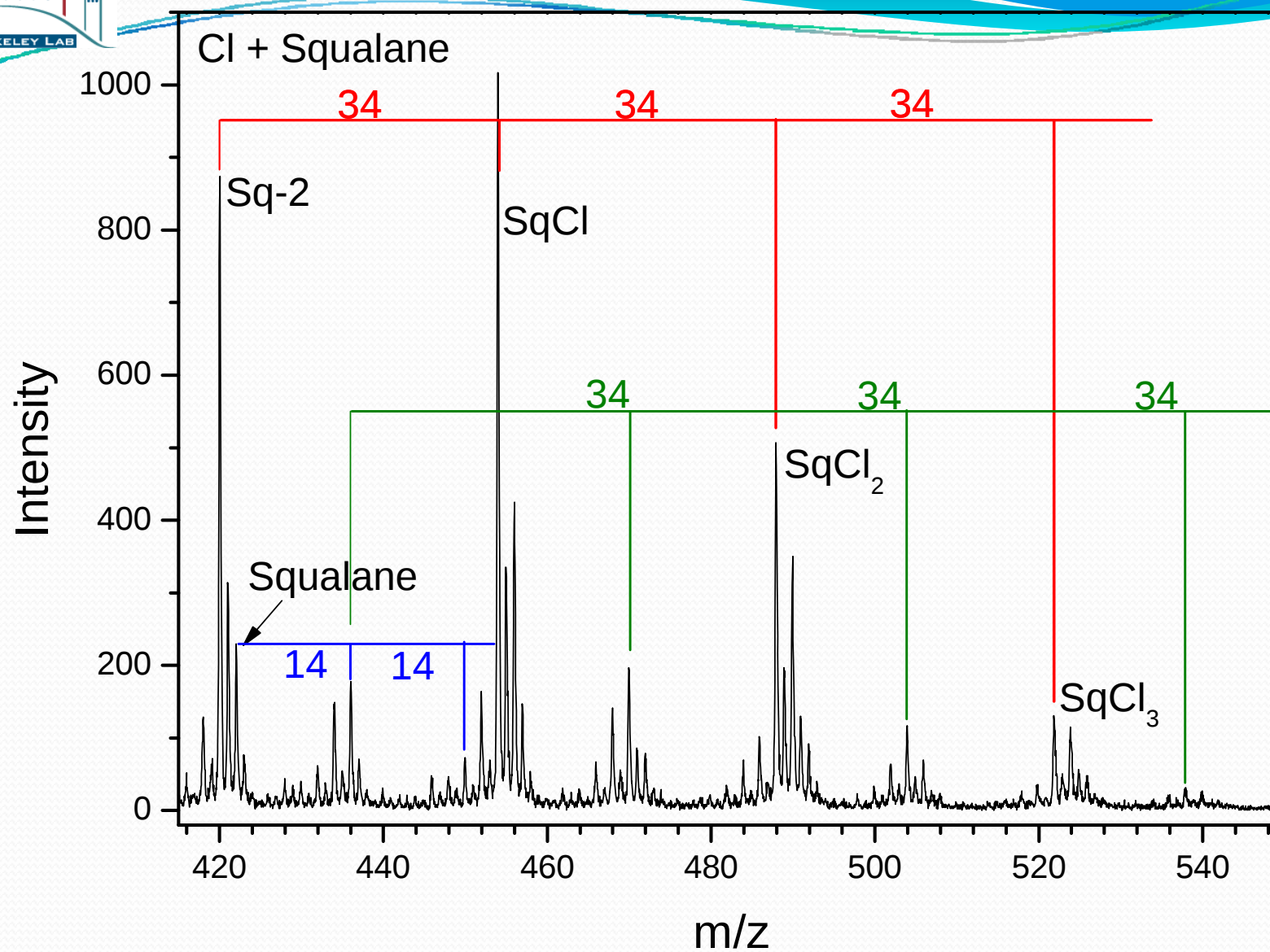
From this check, all products are not alkenes.

Confusing reaction mechanism

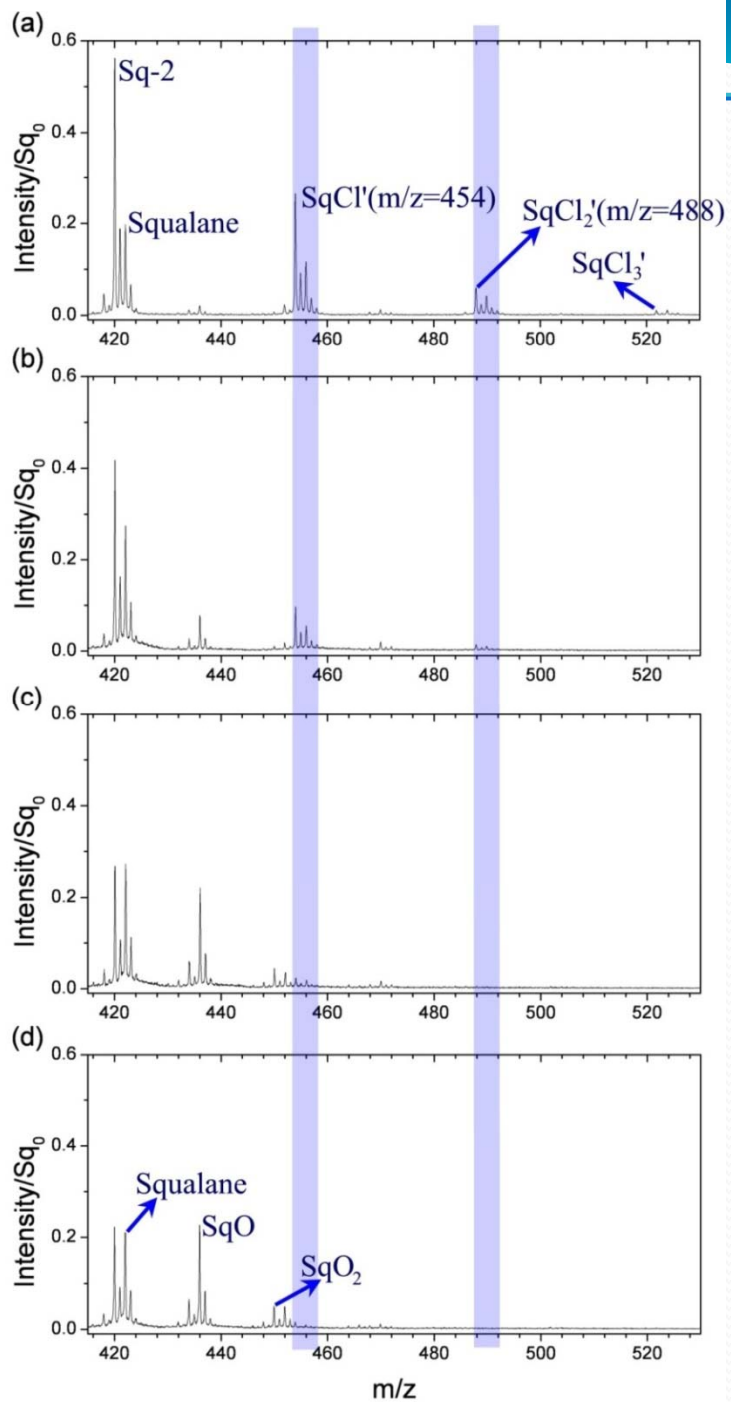


Confusing reaction mechanism

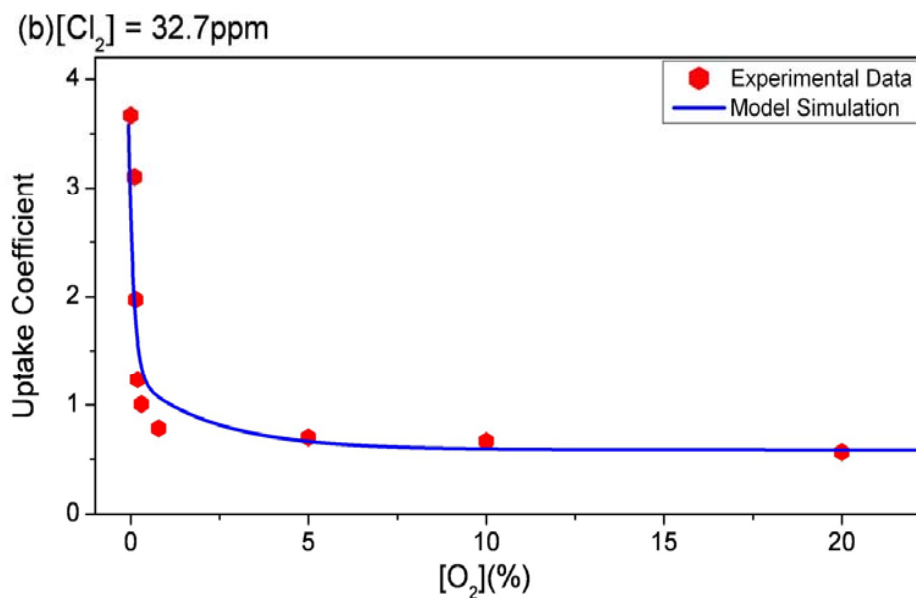
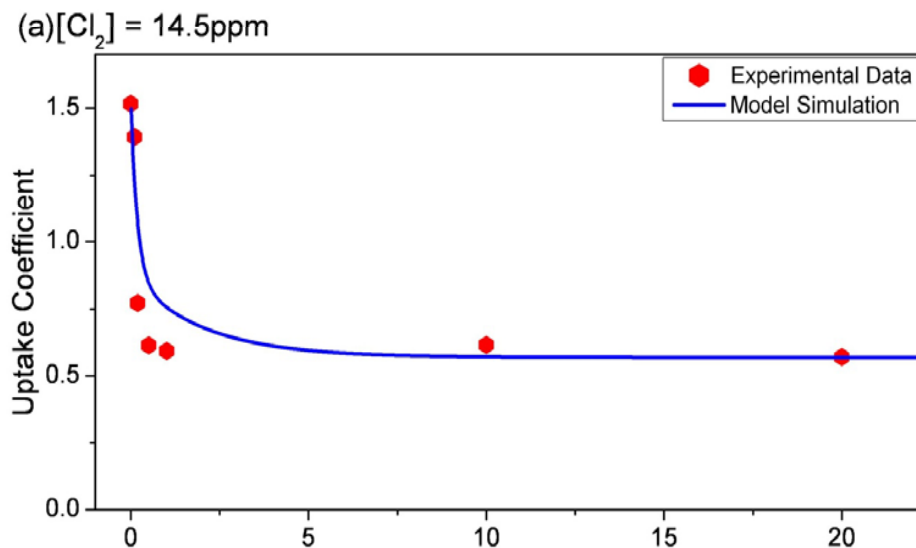




From the TOF MS, the first product is Sq-2 and the second one is SqCl,...etc. The SqO, SqClO,... might be also from Sq and SqO..., respectively.



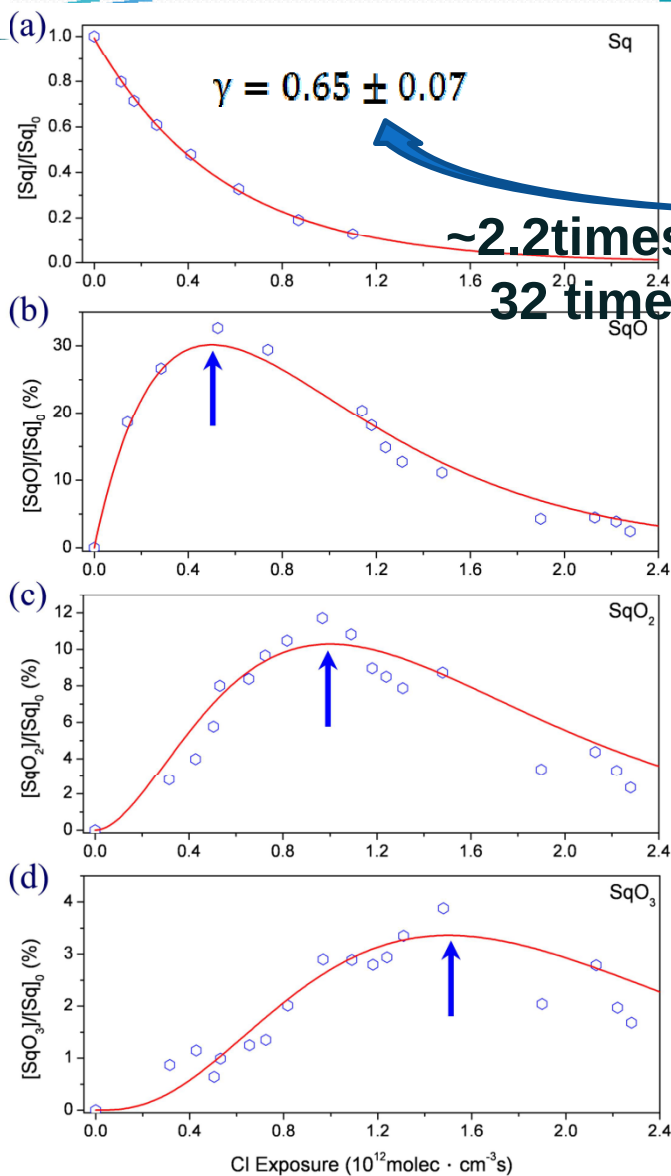
Increasing $[O_2]$



PCCP, **13**, 8993 (2011)

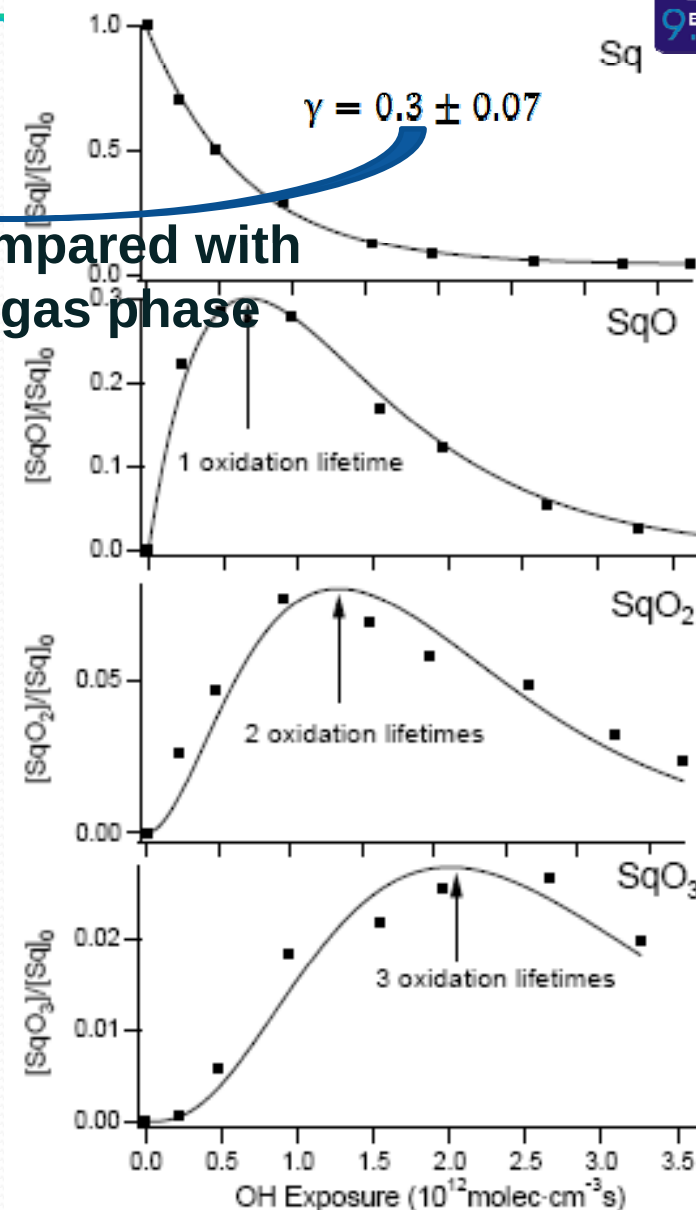
$$\bar{c} \cdot 6 \cdot M_{Sq}$$

Squalane + Cl

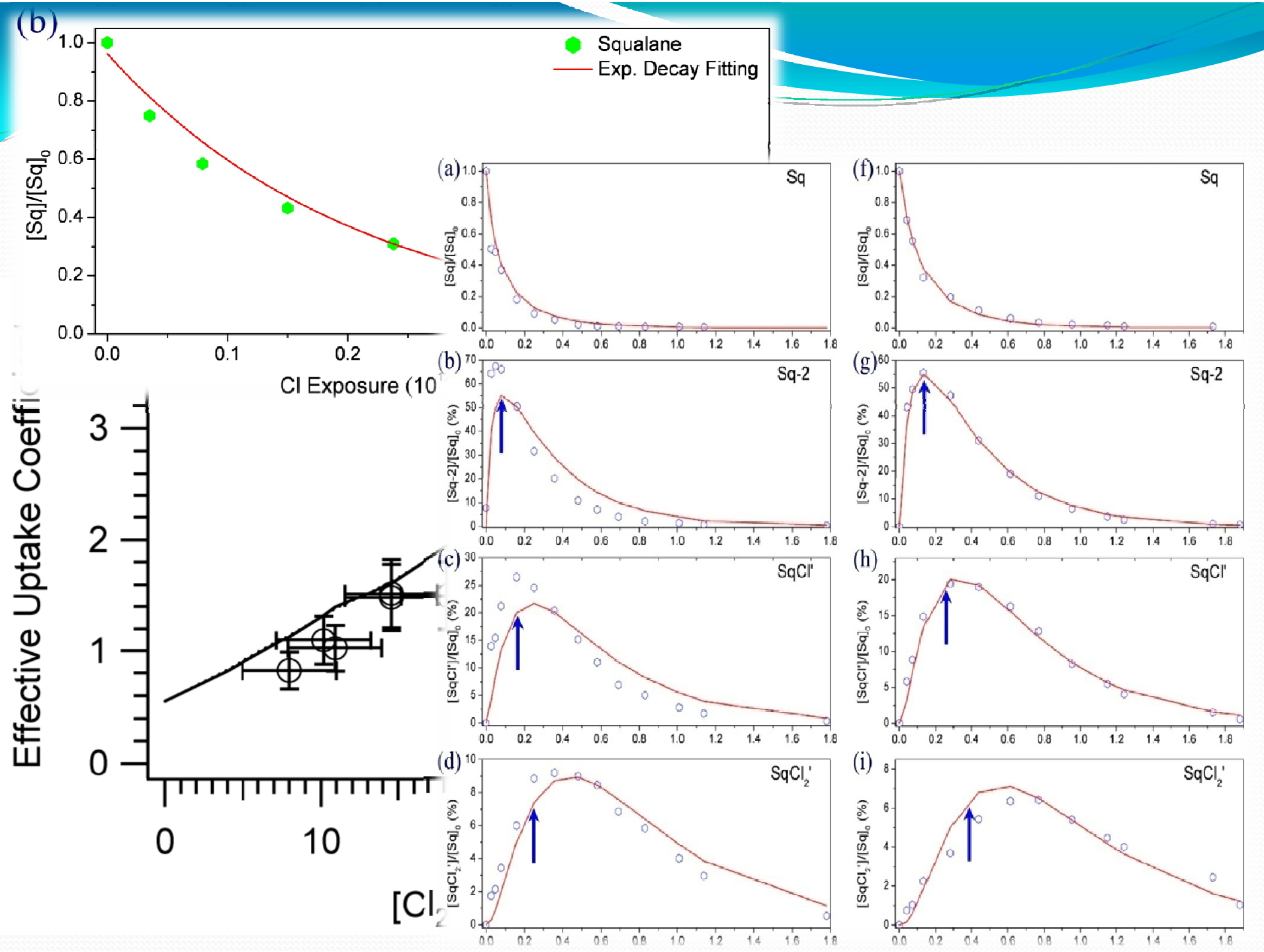


PCCP, **13**, 8993 (2011)

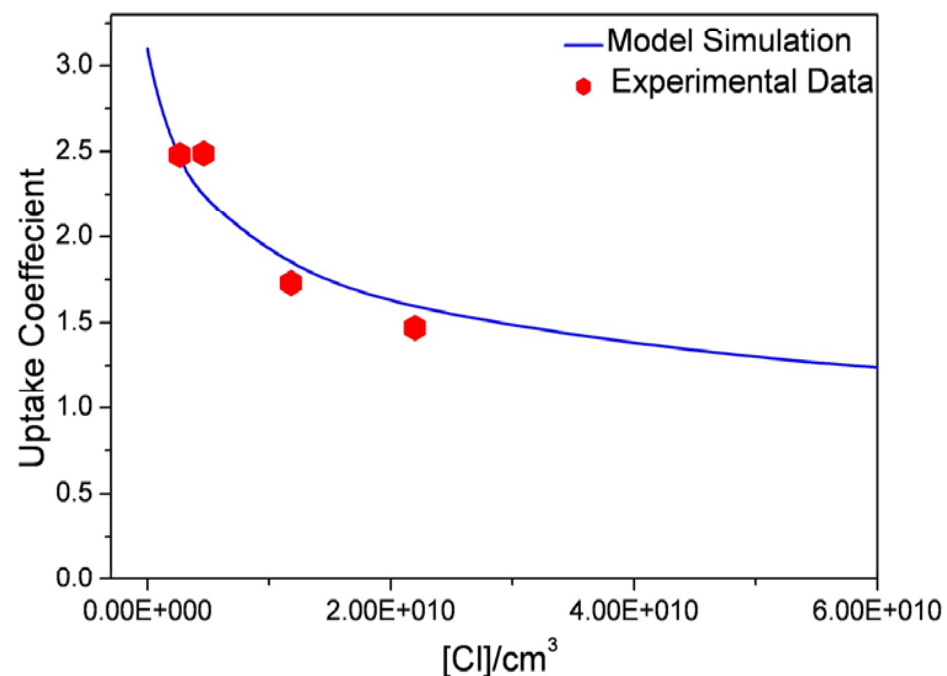
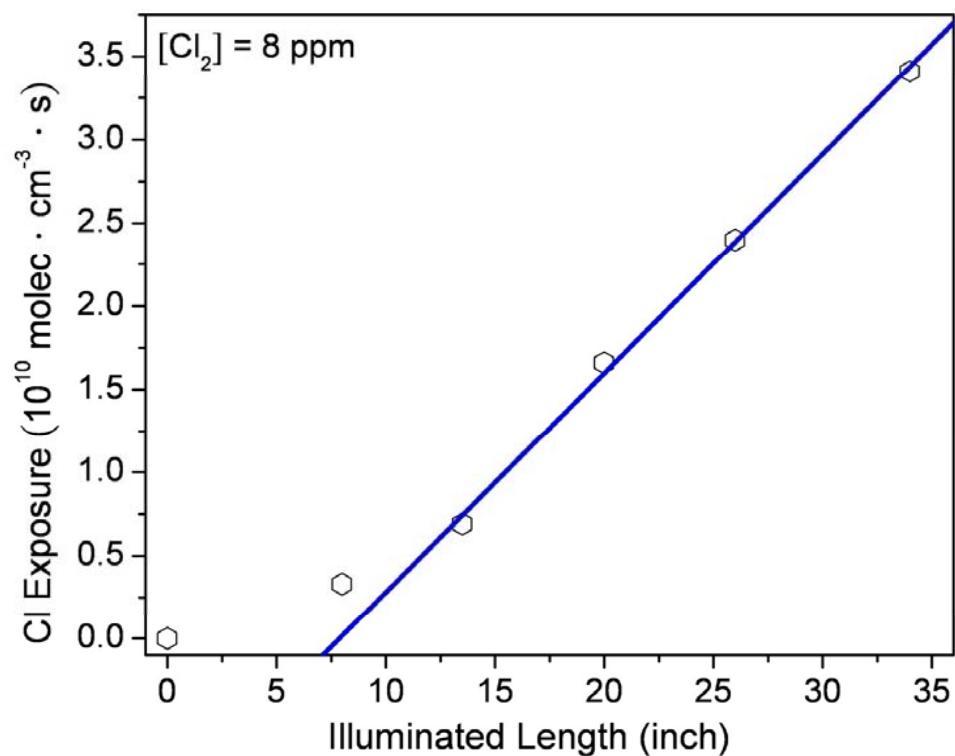
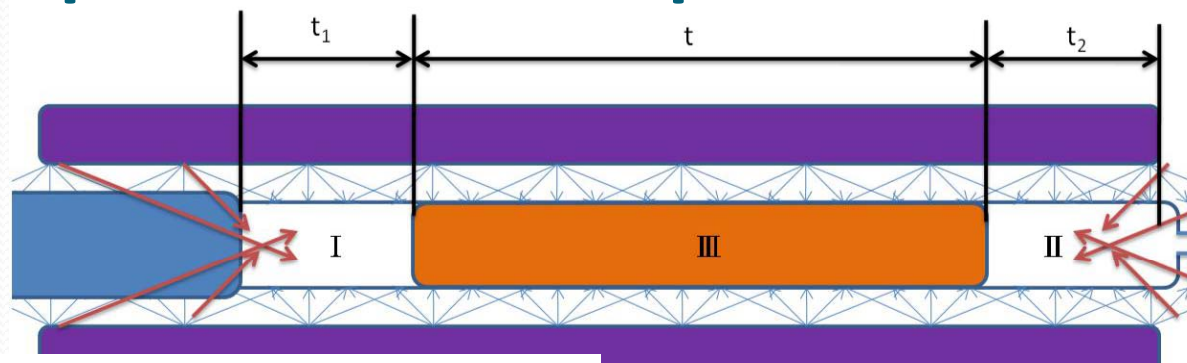
Squalane + OH



Atmos. Chem. Phys., **9**, 3209

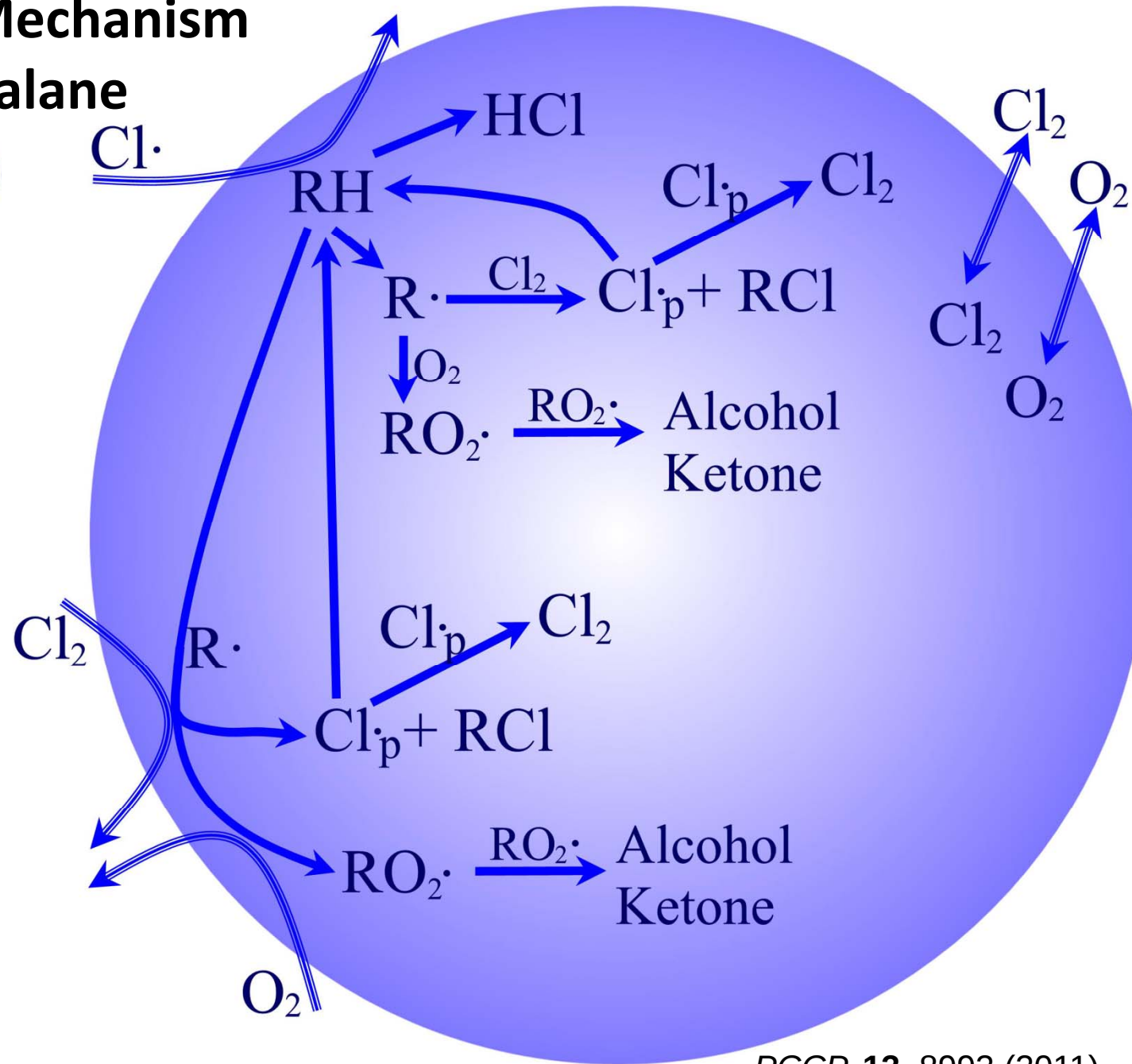


[Cl] dependent experiments

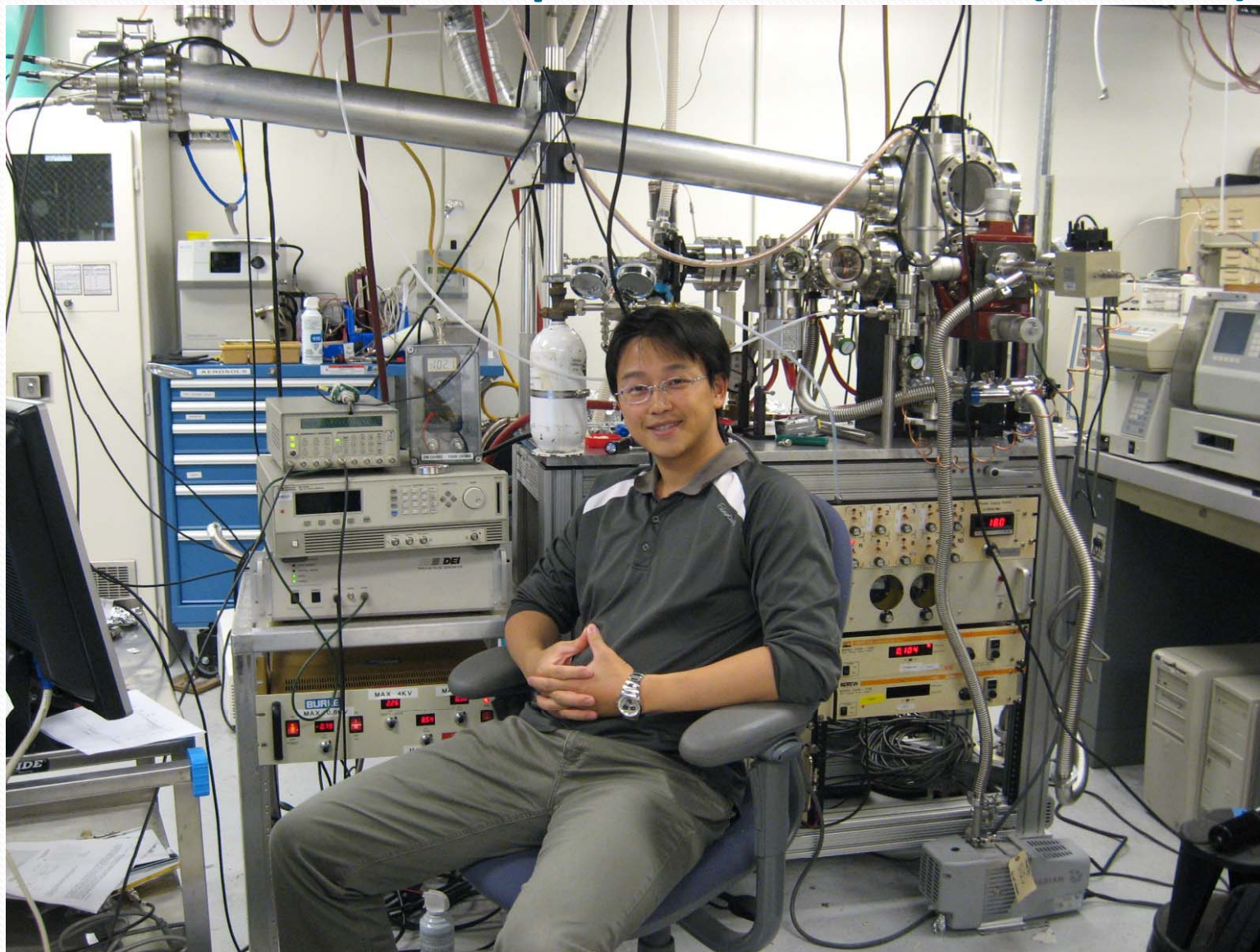


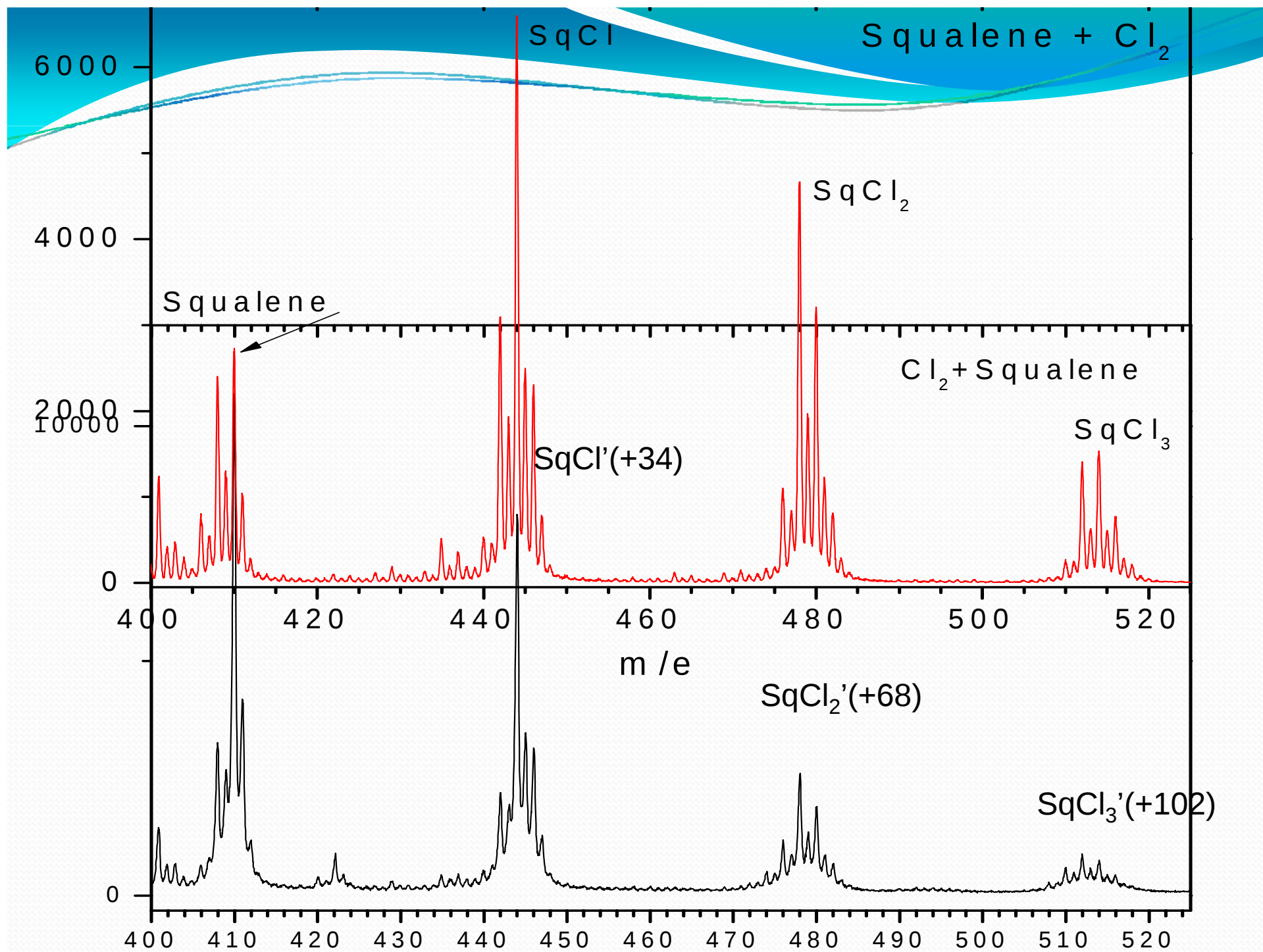
PCCP, **13**, 8993 (2011)

Reaction Mechanism of Cl + Squalane



Aerosol Mass Spectrometer(AMS)







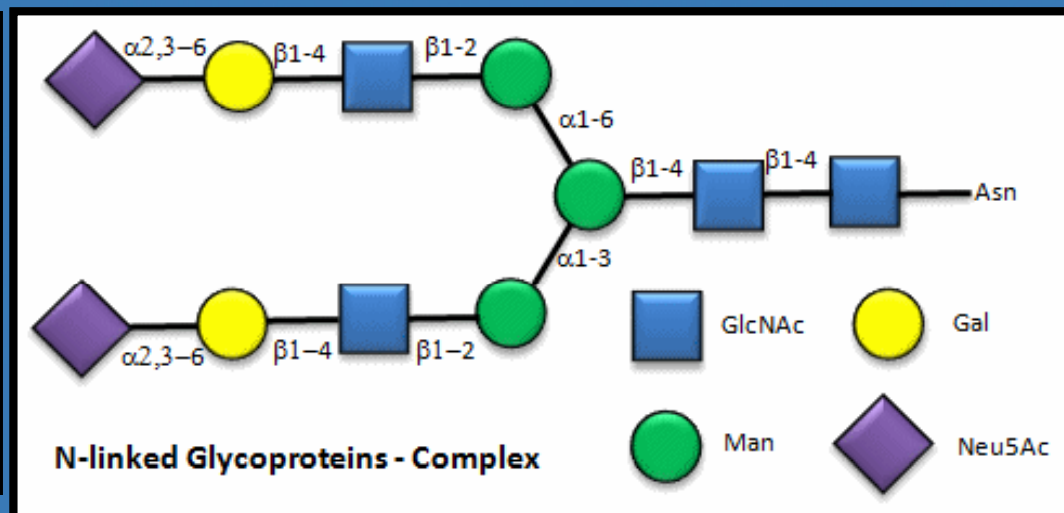
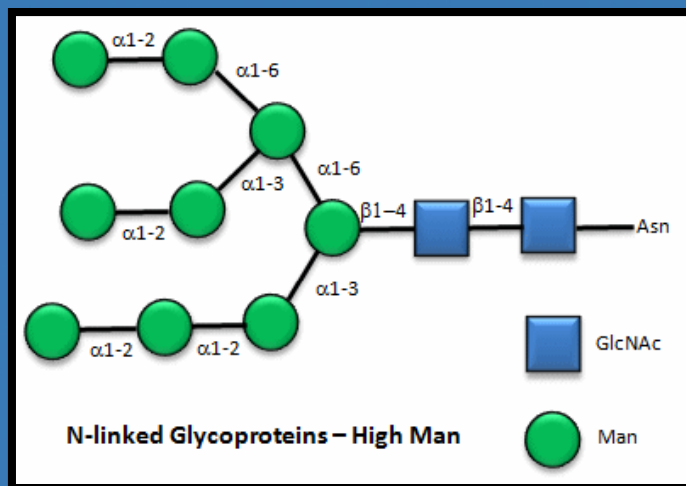
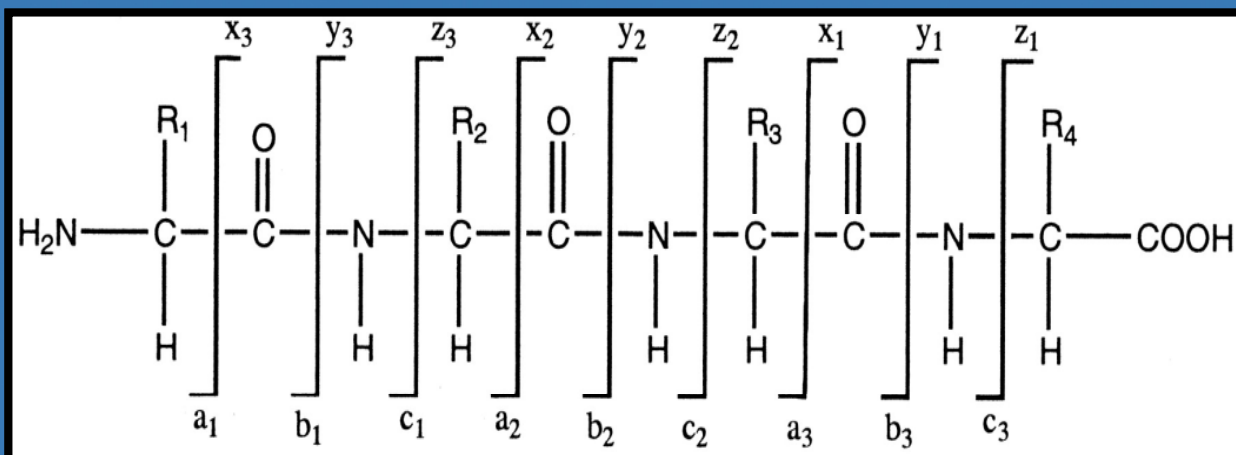
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Future Experiment: Carbohydrate Identification by Utilizing Core Level Excitation

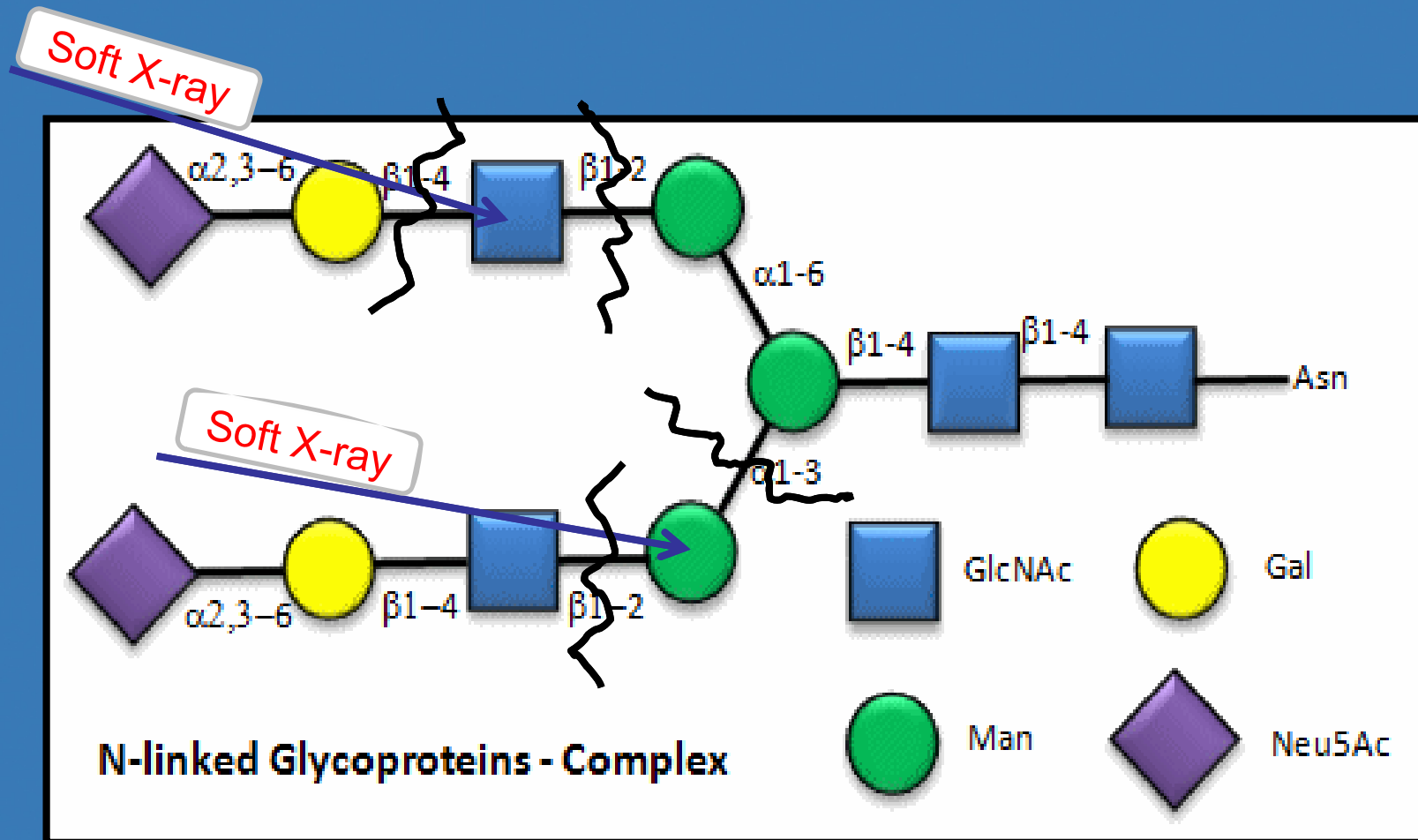
NSRRC



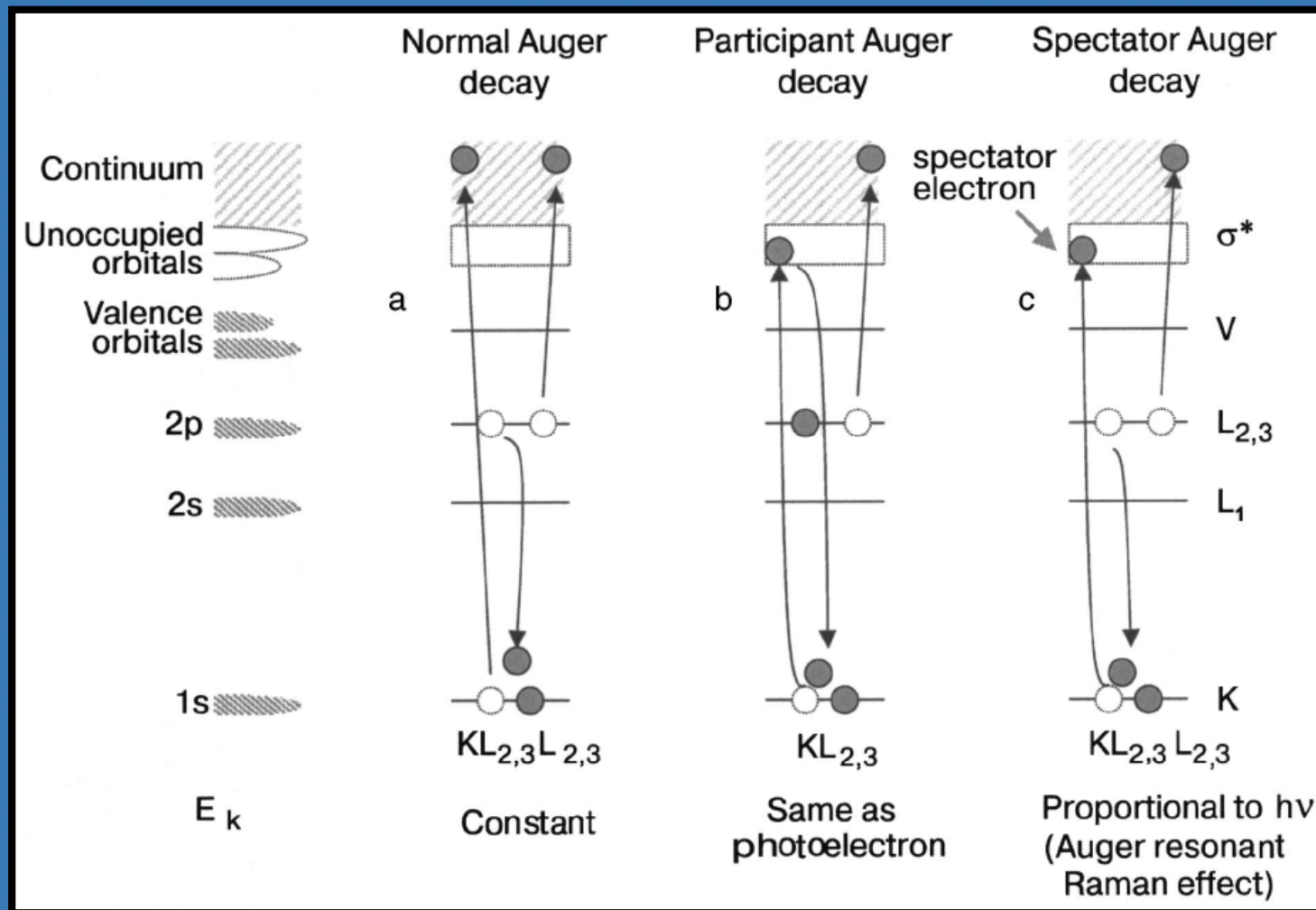
The difficulty of structure identification for carbohydrates by using MS



Our Strategy



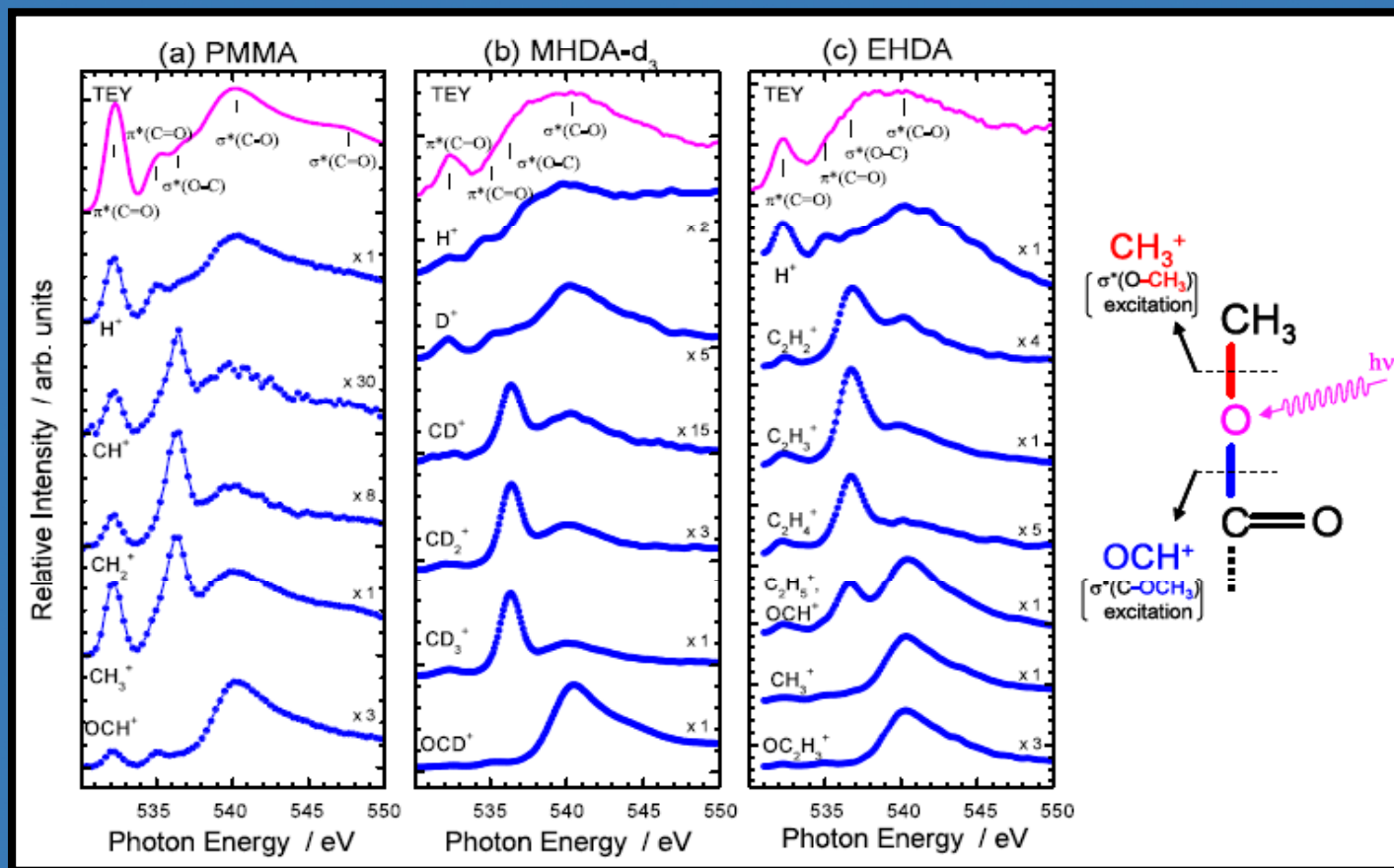
Auger Decay following core level excitation



Y. Baba, Low Temperature Physics **29** (3), 228-242 (2003).



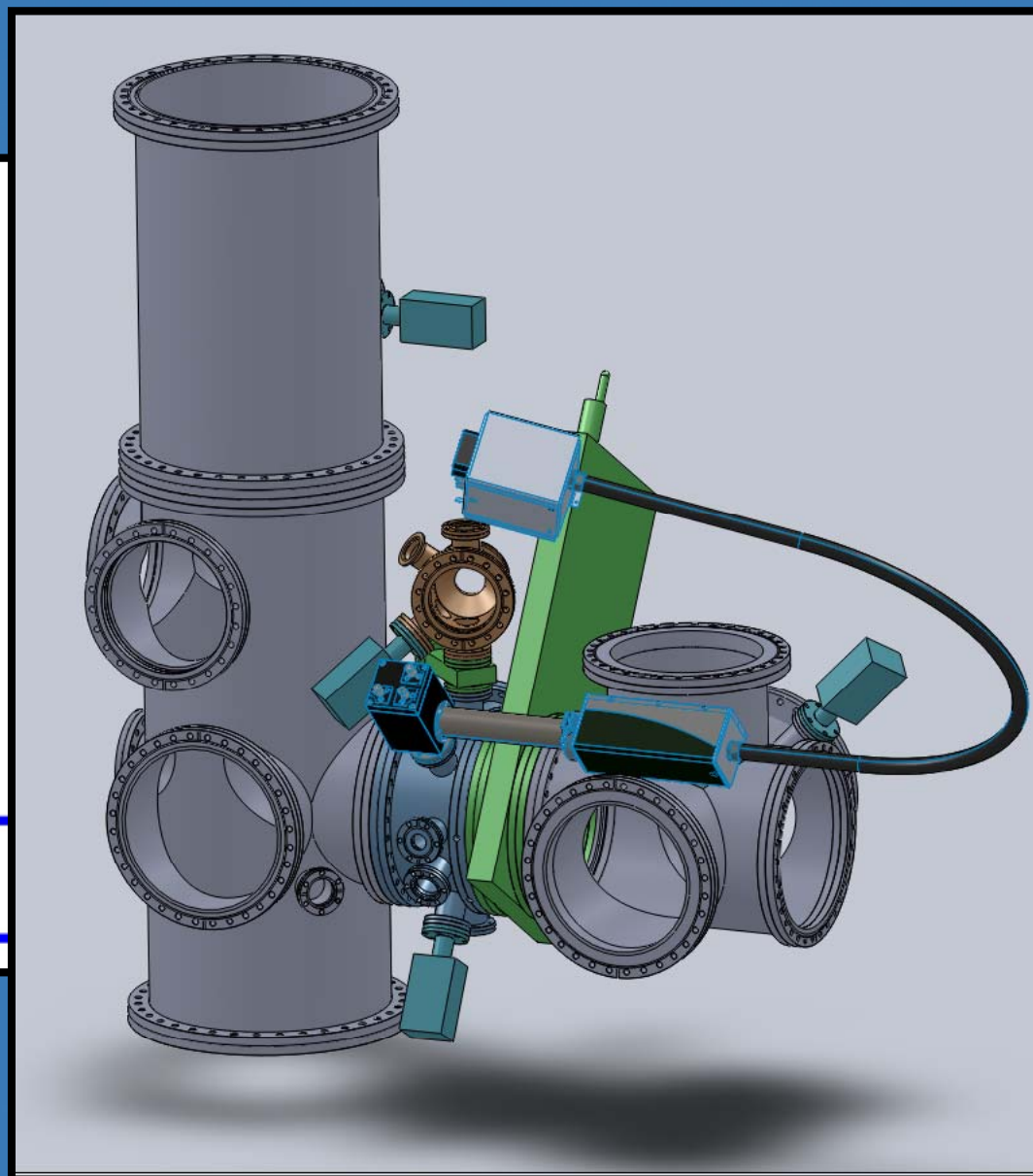
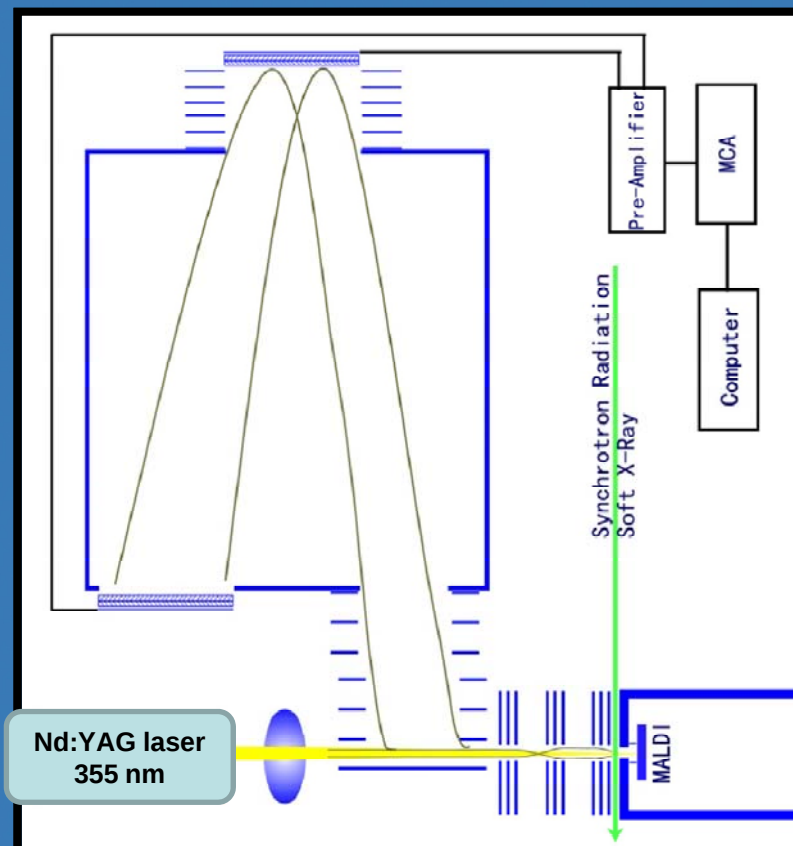
An obvious example of bond-selective dissociation following Auger decay



S.-i. Wada, H. Kizaki, Y. Matsumoto, R. Sumii and K. Tanaka, *Journal of Physics: Condensed Matter* **18** (30), S1629 (2006).



Apparatus





Acknowledgement

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Chris Harmon
Theodora Nah



DOE
LBNL
NSC





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Thanks for your attentions!

Questions?? Comments??

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