EELS Study of Phenol on TiO_2

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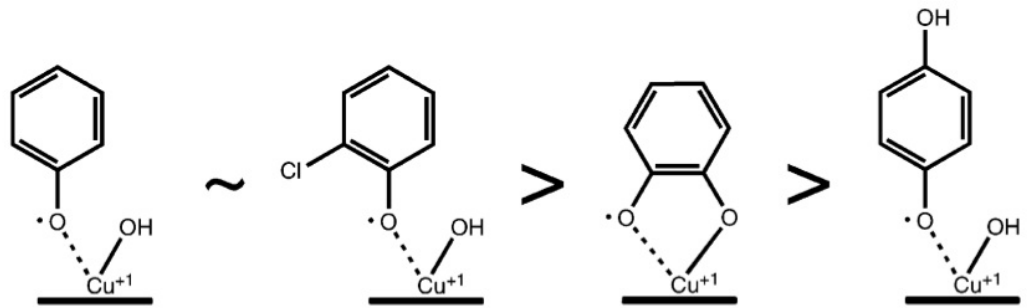
Motivation

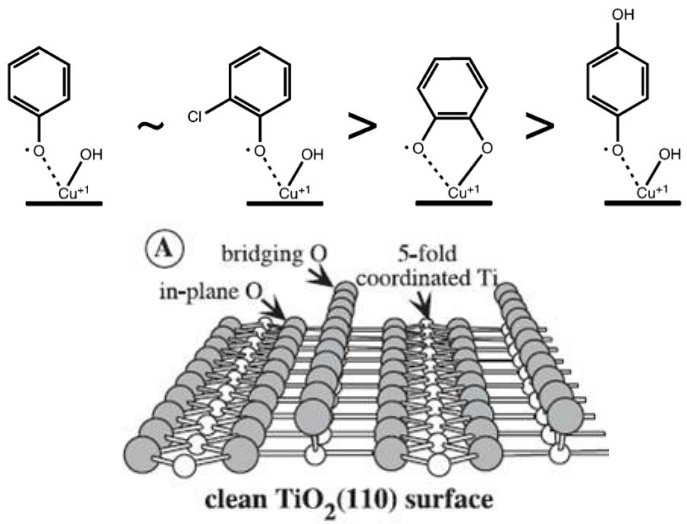
EPFR-Environmentally Persistent Free Radical

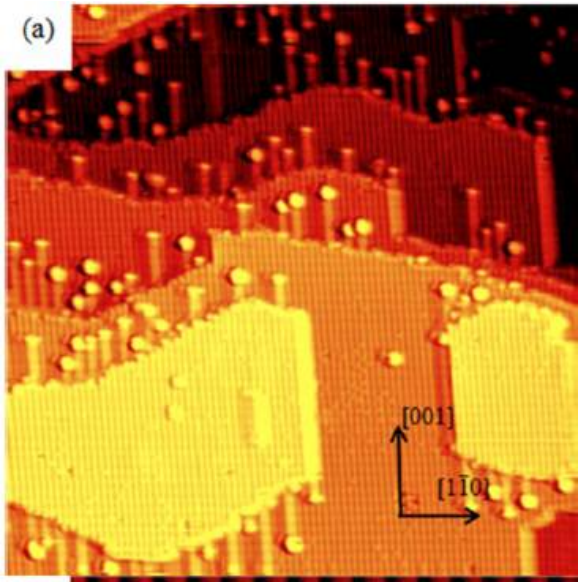
- Radicals are usually short lived with a life in the fractions of a second
- EPFR are long lived radicals that are found in natural factory settings such as combustion reactions
- Importance: Can be hazardous to health and is unknown on how they form



Example of EPFR's

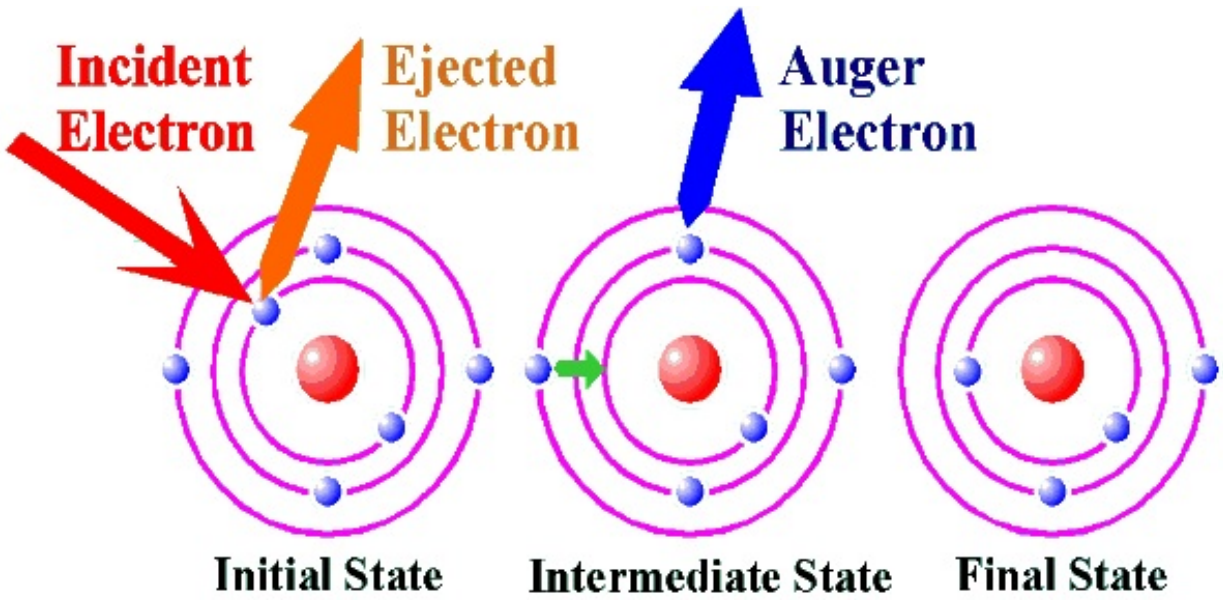
How We Do This



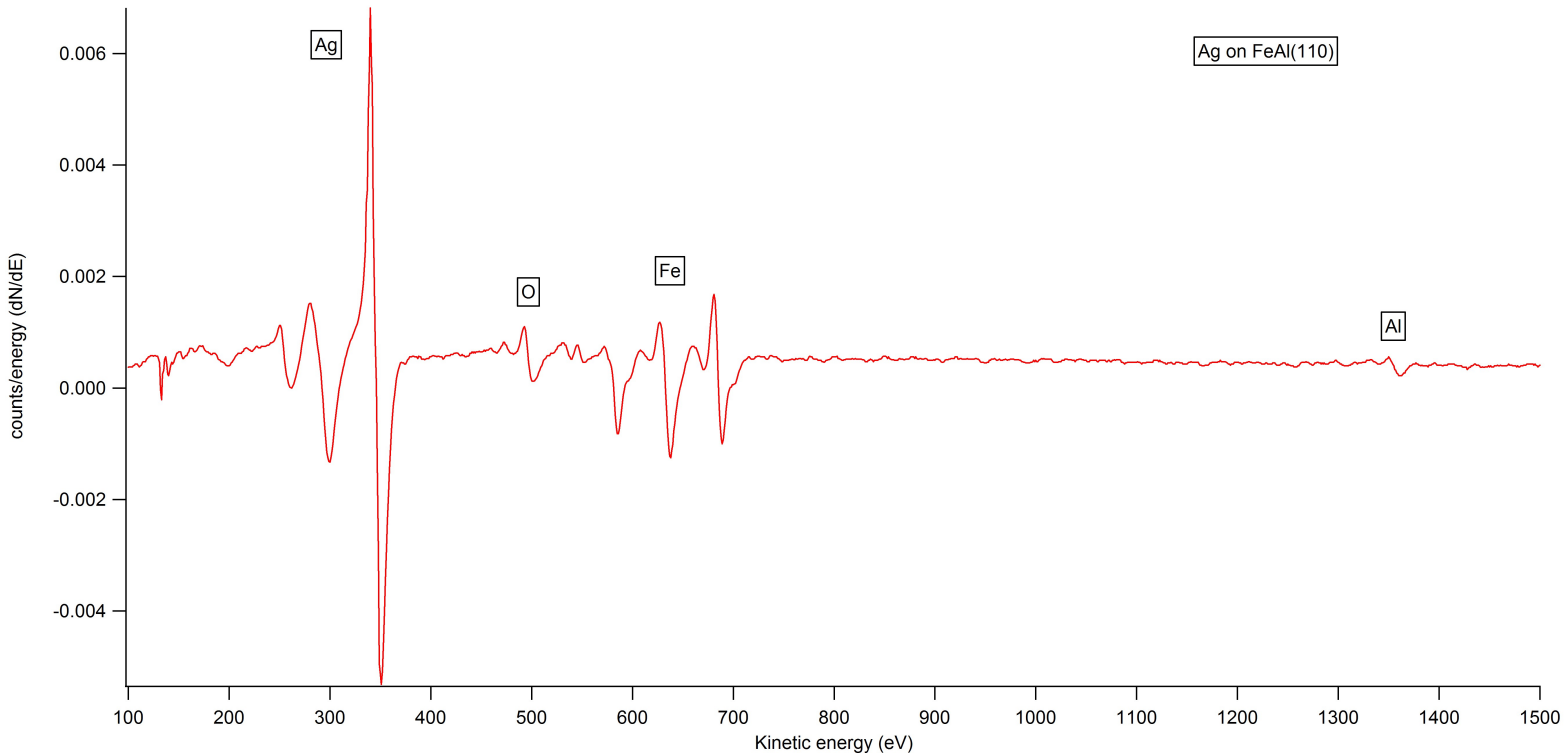


- Auger
- EELS

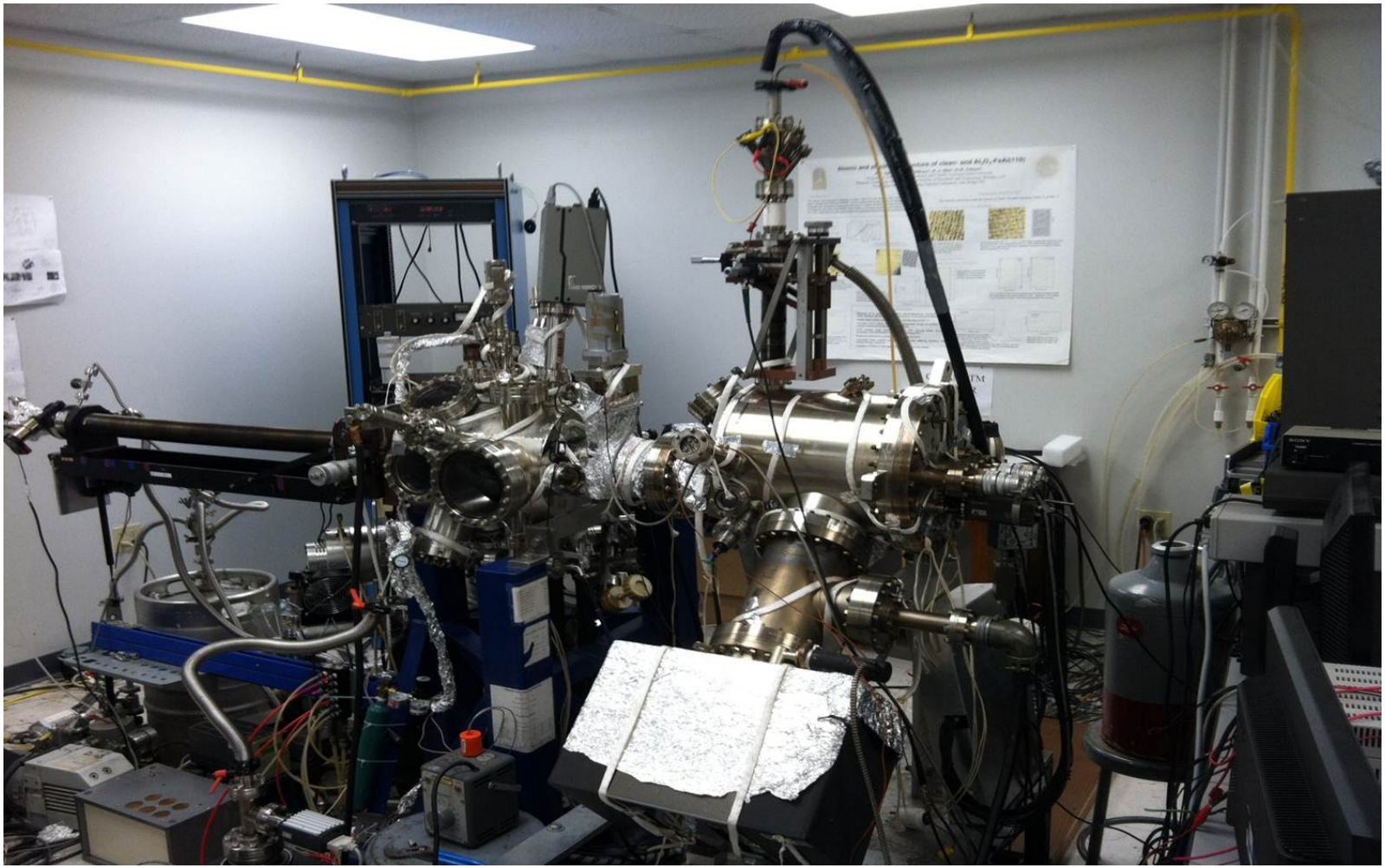
Device: Auger



Auger Spectrum

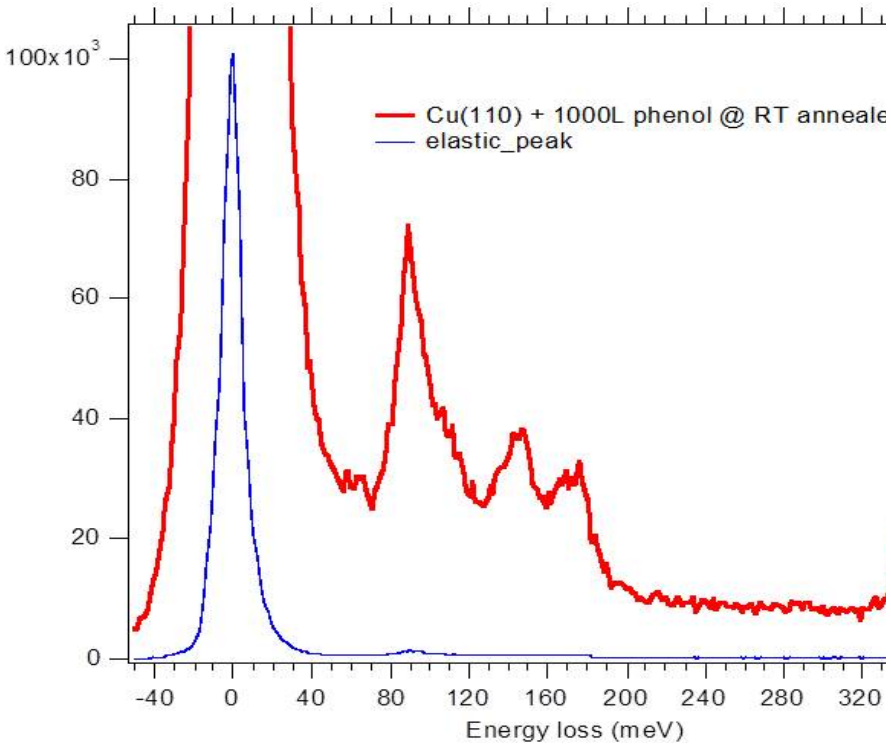


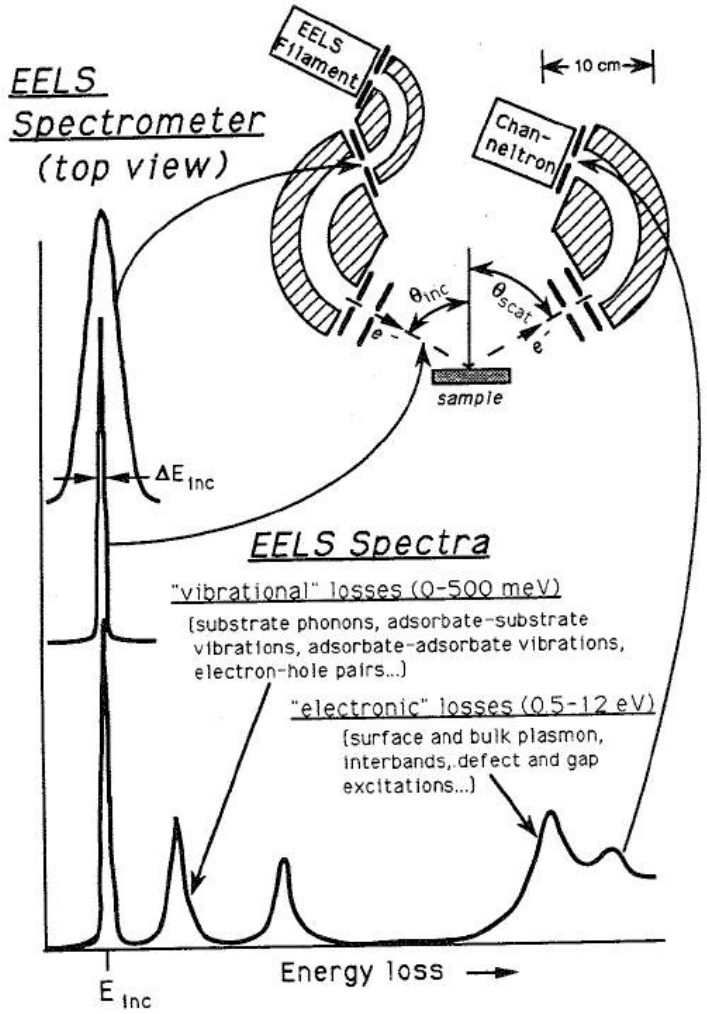
Device: EELS



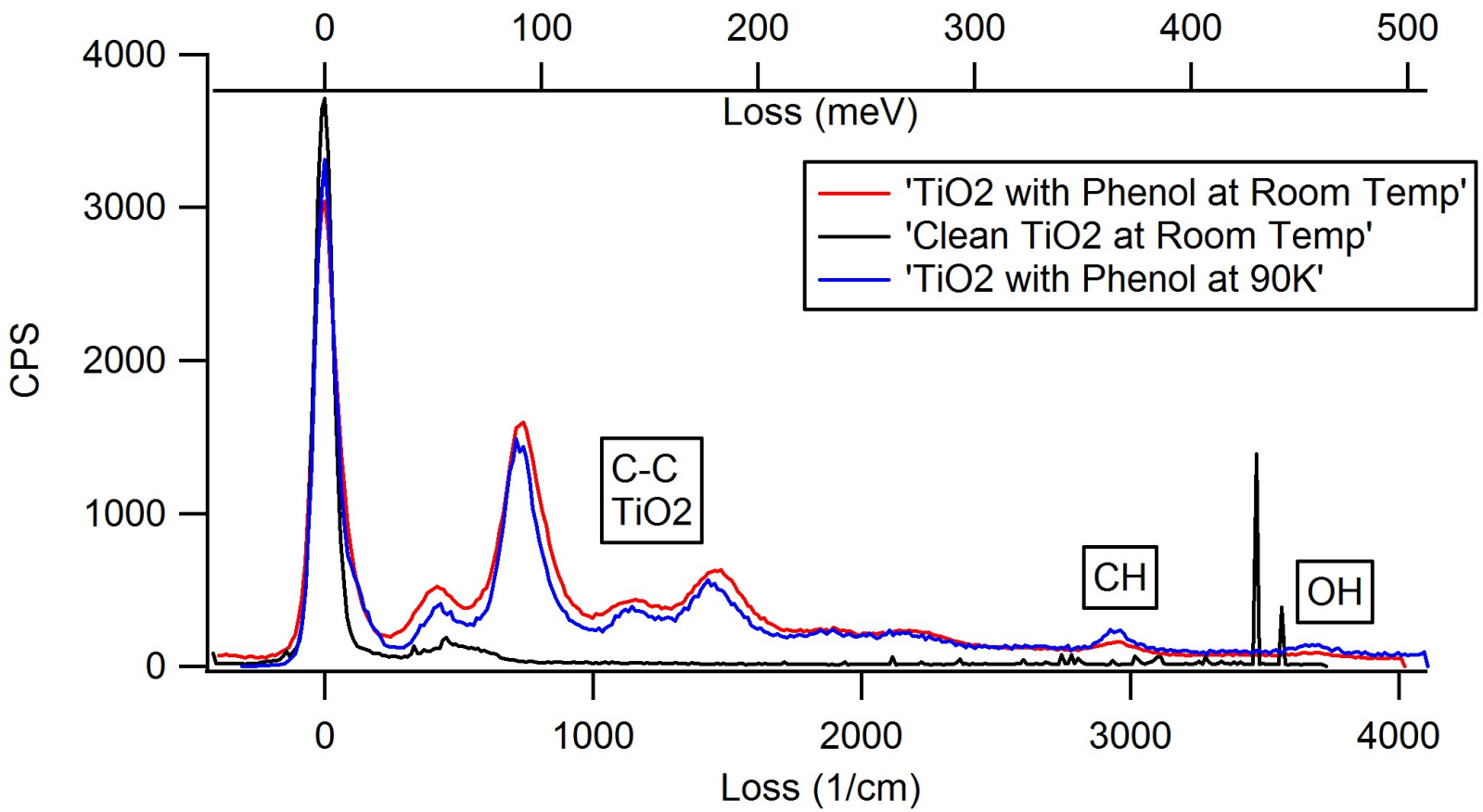
Electron Energy Loss Spectroscopy

Device: EELS


100x10^3
80
60
40
20
0
Cu(110) + 1000L phenol @ RT anneale
elastic_peak
-40
0
40
80
120
160
200
240
280
320
Energy loss (meV)


EELS Spectrometer (top view)
EELS Filament
10 cm
Chan-neltron
θinc
θscat
e-
e-
sample
ΔE inc
EELS Spectra
"vibrational" losses (0-500 meV)
(substrate phonons, adsorbate-substrate vibrations, adsorbate-adsorbate vibrations, electron-hole pairs...)
"electronic" losses (0.5-12 eV)
(surface and bulk plasmon, interbands, defect and gap excitations...)
E inc
Energy loss

Data



Conclusion

Future Work

- CAMD-Photoemission
- Raise Temperature to mimic the environment