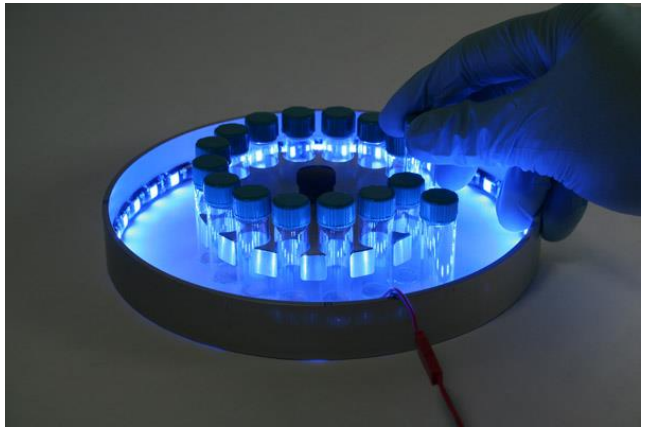
Lamps in Kanai laboratory

White LED (visible light)
株式会社ヴァローレ製
http://www.valore.jp/led/vbl_s.html

LED of specific wavelength (e.g. purple or green)
株式会社ヴァローレ製
http://www.valore.jp/led/vbl_s.html



Aldrich LED (435 or 400 nm)
http://www.sigmaaldrich.com/japan/labware/micro-photochemical-reactor.html

UV LED (365 nm) 大興製作所製
http://www.daico.co.jp/products/products.php?id=21

Setup of photoreactions (visible light LED)

Reaction vessel

LED lamp

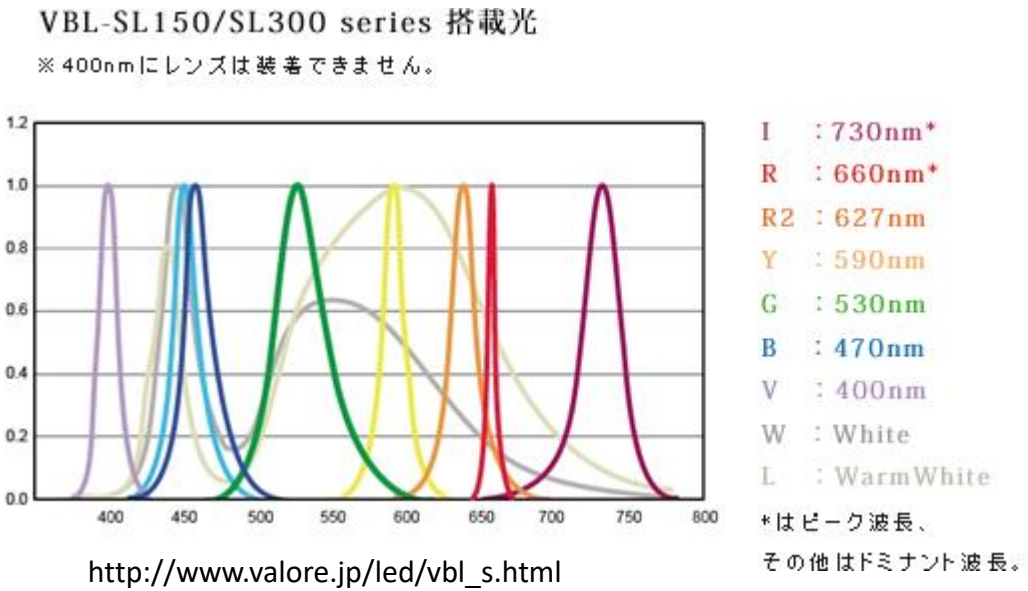
- Put the reaction vessel ca. 2 cm from the lamp.
- White LED is stored in a box behind the old glove box (4F refresh room).
- Light intensity can be modulated with 2 dials.

Intensity dial

On/Off switch

Controller of Valore LEDs

Spectra of Valore LEDs



http://www.valore.jp/led/vbl_s.html

Setup of photoreactions (UV)

Run reactions in the UV-cut box.
(It is in the measurement room of 4th floor.)

[CAUTION!]
UV is harmful. Never use UV lamps out of the box.

37-degree experiment

500 nm LEDs are used in Sohma group for biological study.
They are stored in

- Incubator at 4F
- Eisai 1F

Tips

[In general]
- Photoreactions should be run in a test tube or a screw vial. Flasks do not give good results.
- Large scale reactions usually result in poor yield.

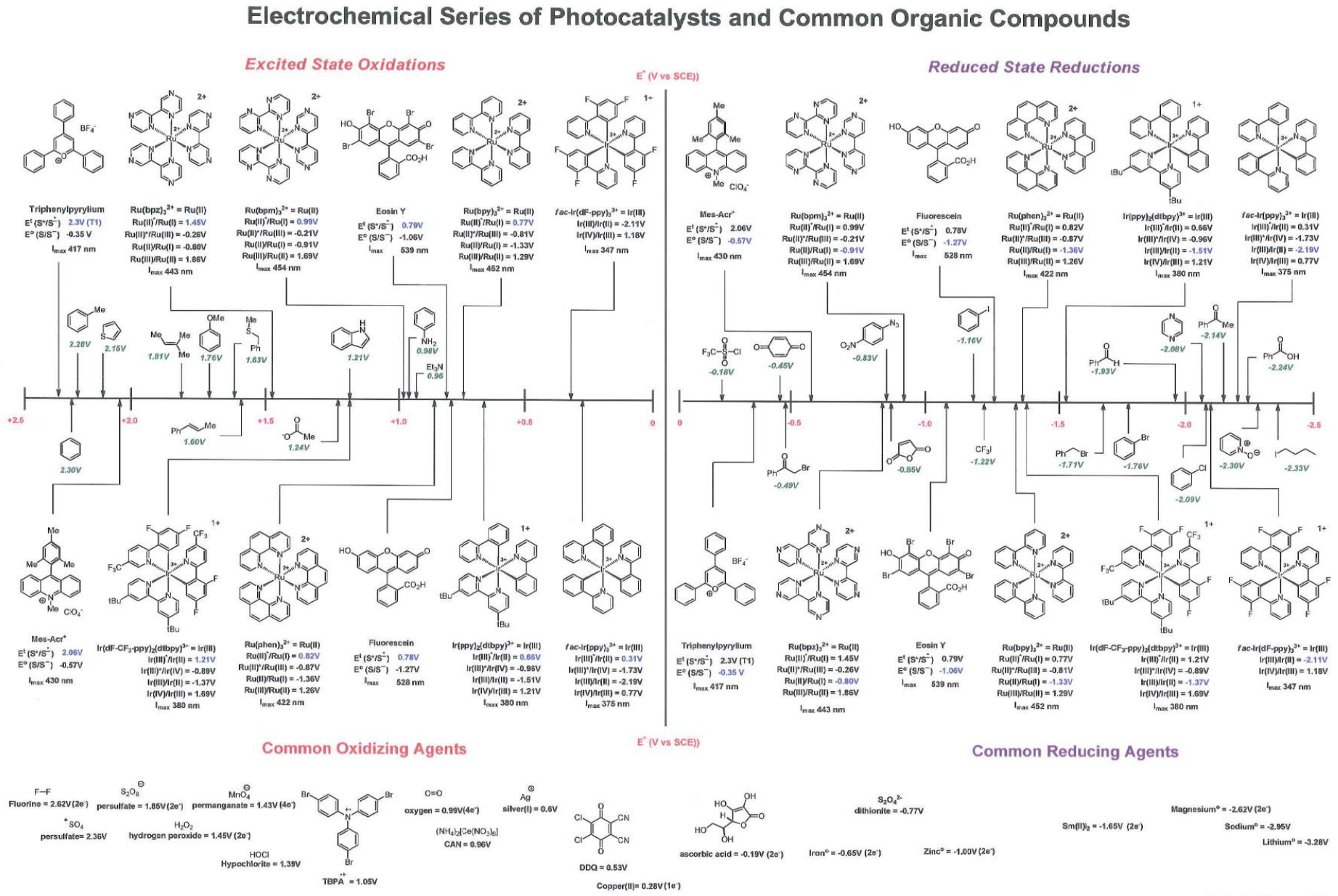
[Reaction in a screw vial]
- Vials can be put in a fraction collector (large), then in front of the lamp. (See appendix 3)
- Aldrich LED is suitable for a 4 mL screw vial.

[For visible light]
- White LED is recommended for initial trials.
- Light is too shiny for people around you. Put cartons or aluminum foils around the reaction.

[For UV]
- UV light is harmful, so be sure to use it inside the UV-cut box.
- Turn on the fan attached on the UV-cut box (in order to release the heat inside the box).

[Recommended reviews of photoredox catalysis]
- 有機合成化学協会誌 2014, 72, 538.
- *Chem. Rev.* **2013**, *113*, 5322. (with λ_{max} and $E_{1/2}$ of representative photoredox catalysts)

Appendix 1: Redox potential of common photocatalysts



http://brsmblog.com/wp-content/uploads/2014/09/Electrochemical-Series.pdf

MERCK

Appendix 2: Absorption and excited state lifetime of common photocatalysts

entry	photocatalyst	excited-state lifetime, τ (ns)	excitation λ_{max} (nm)	emission λ_{max} (nm)	ref
1	$Ru(bpm)_3^{2+}$	131[b]	454	639[b]	161
2	$Ru(bpz)_3^{2+}$	740	443	591	55
3	$Ru(bpy)_3^{2+}$	1100	452	615	1, 3
4	$Ru(phen)_3^{2+}$	500	422	610[c]	1, 129
5	$Ir[dF(CF_3)ppy]_2(dtbbpy)^+$	2300	380	470	77
6	$Ir(ppy)_2(dtbbpy)^+$	557		581	58, 77
7	$Cu(dap)_2^+$	270		670[d]	33
8	*fac*-$Ir(ppy)_3$	1900	375	494[e]	38

Modified from *Chem. Rev.* **2013**, *113*, 5322.

Appendix 3: Photoreactions with many vials

3 vials can be piled up in one fraction collector.