The University of Texas at Austin
Cockrell School of Engineering

August 2025

# STARTING TIPS: MAKING PRESENTATIONS (AND POSTERS)

(Have a nice title slide)

Wang Materials Group Meeting Tutorials

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(Have a nice title slide)

# Starting tips:
# Making Presentations (and Posters)

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Professional Development Elective, Group Tutorial
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The University of Texas at Austin
McKetta Department of Chemical Engineering
Cockrell School of Engineering

TEXAS MATERIALS INSTITUTE
Materials Science & Engineering

# Why bother?

Effective science involves effective communication

How will people know your work is cool
if they cannot understand it?

# Treat every talk as a job talk

- It’s a chance to show everyone what you’ve done!
- You never know who might be in the audience!

  (I later learned the later Division Head at the Beijing Computational Science Research Center was in the audience at my first conference presentation!)
- Your talk is a representation of yourself, your group, the department, and UT Austin
- Every presentation is a networking opportunity
  - Have business cards ready – practiced more frequently in other cultures
  - Include contact information
  - Use technology to your advantage (QR codes, Twitter handles)

# Know your audience

How much background should you prepare?
How much jargon and technical detail should you use?

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Graduate students? Undergraduate students?

Field Experts and Senior Scientists?

General public?

If unsure, upper undergrad/lower graduate level is a good level to start at

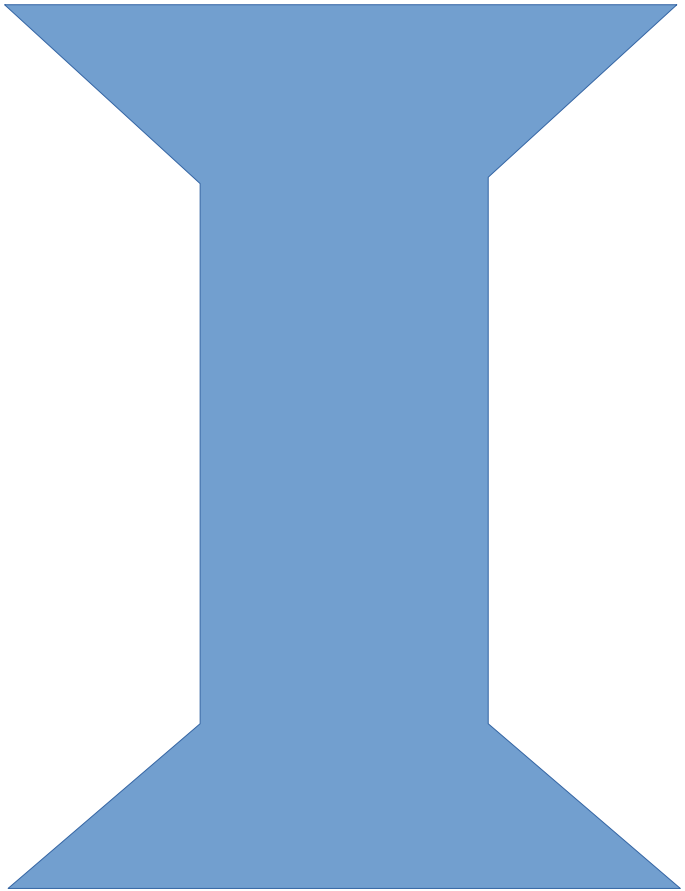
Spend the time to properly motivate why the research is important-
even if people don't understand all of the technical details of the results,
they can at least appreciate the impacts

# Know/Set up the space

| **In-person** | **Zoom** |
|---|---|
| Test projector and connections | Test audio/visual |
| Laser pointer, slide advancer | Digital pointer |
| Room size-<br>how much to project, move around the room | Breakout rooms, polls? |

https://enterprisersproject.com/article/2020/8/zoom-tips-online-presentations

# Tell a story



Big Picture Context:
- Why is this research important?
- What was the challenge/unknown?

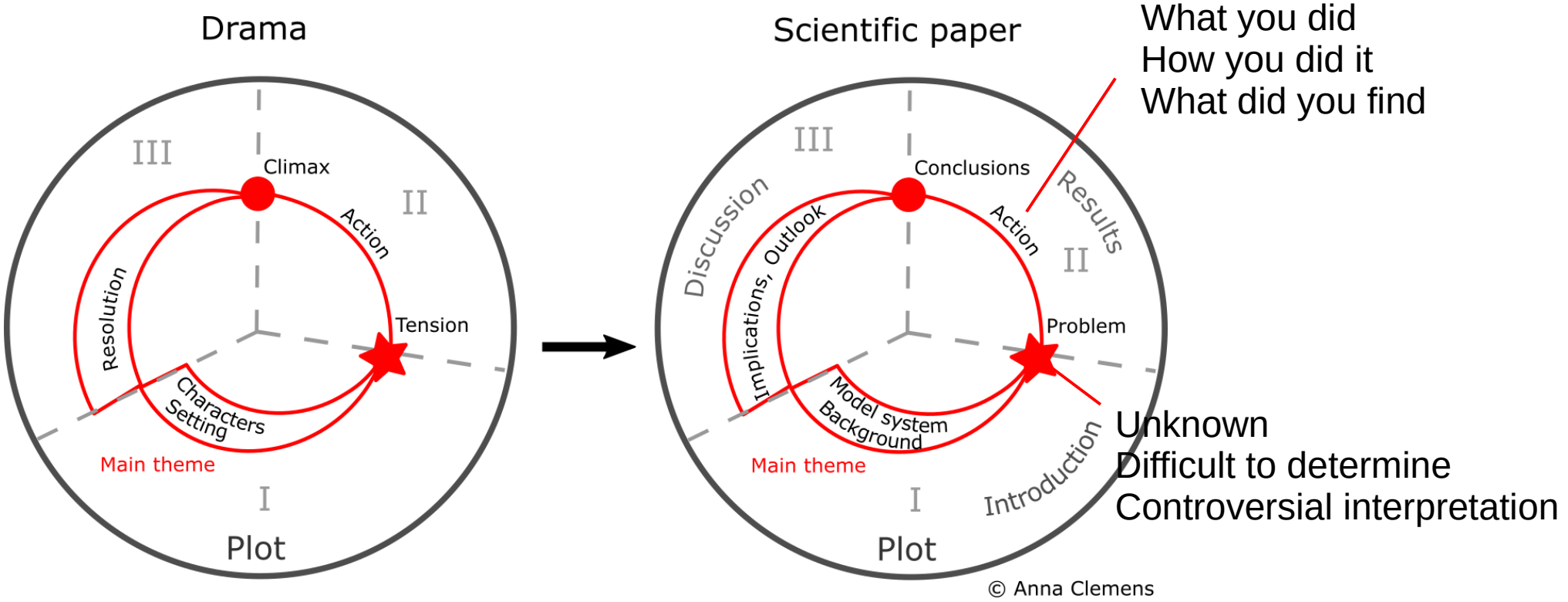
How did you tackle the problem/challenge?
- Methods, approach, idea

What did you find?
- Results and data

How are your results scientifically important?
- Discussion and interpretation
- What did you learn?

Impacts and Significance
- What are the implications of your findings in your project, the field, society?
- What will you do next?

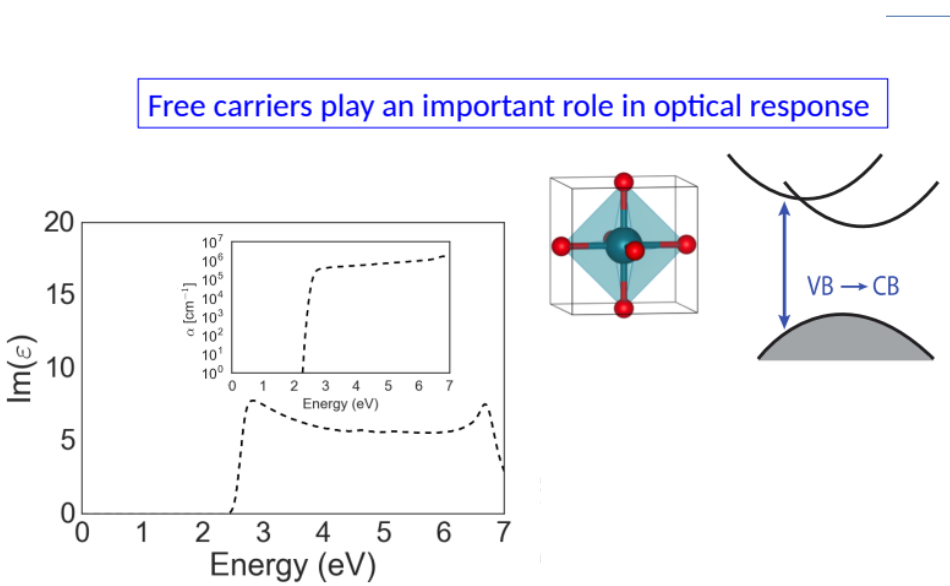
# Tell a story

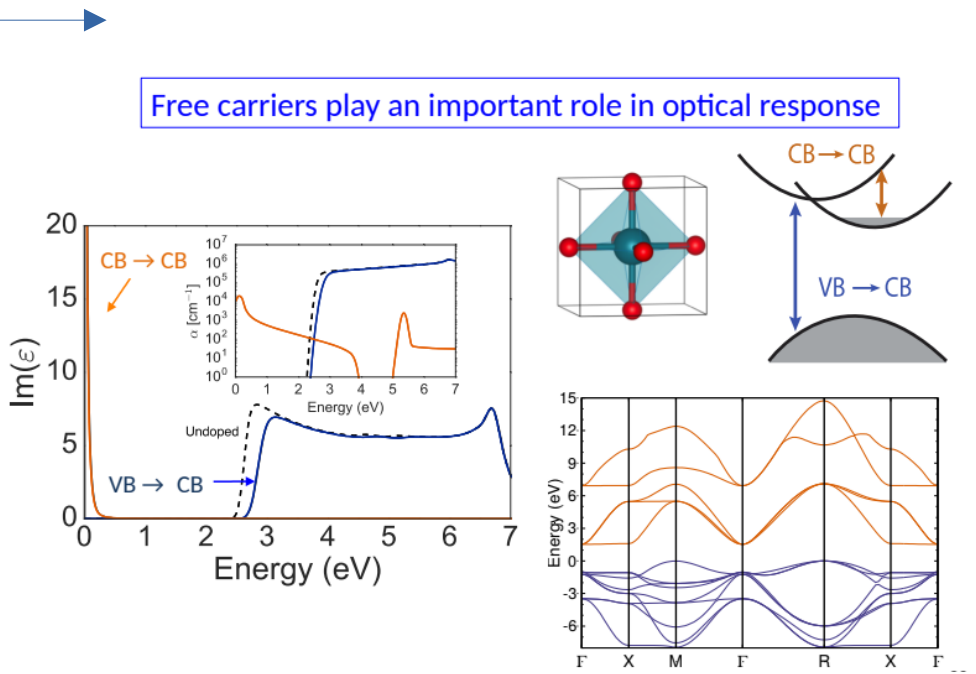



https://www.annaclemens.com/blog/story-structure-scientific-paper

# Break up complex ideas and figures

The audience has about 20s to process and understand the plot while also listening to you
Make it easy for them to follow the data
Use simple animations, e.g., build up a figure



# Guide the audience through *everything*

Assume the audience is pre-occupied or tired:

Tell the audience what you want them to know

“Here are the two main takeaways I want you to remember”
“If there is anything you remember from this presentation, it is...”

Signpost: “When we turn to the results…”, “In conclusion,...”

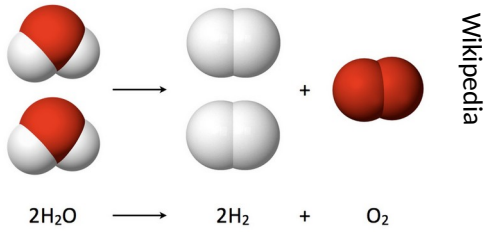
Redundancy is good: either reinforced through speech, figures, text, annotations

For the entire presentation:
what are 1-2 main points you want the audience to take away

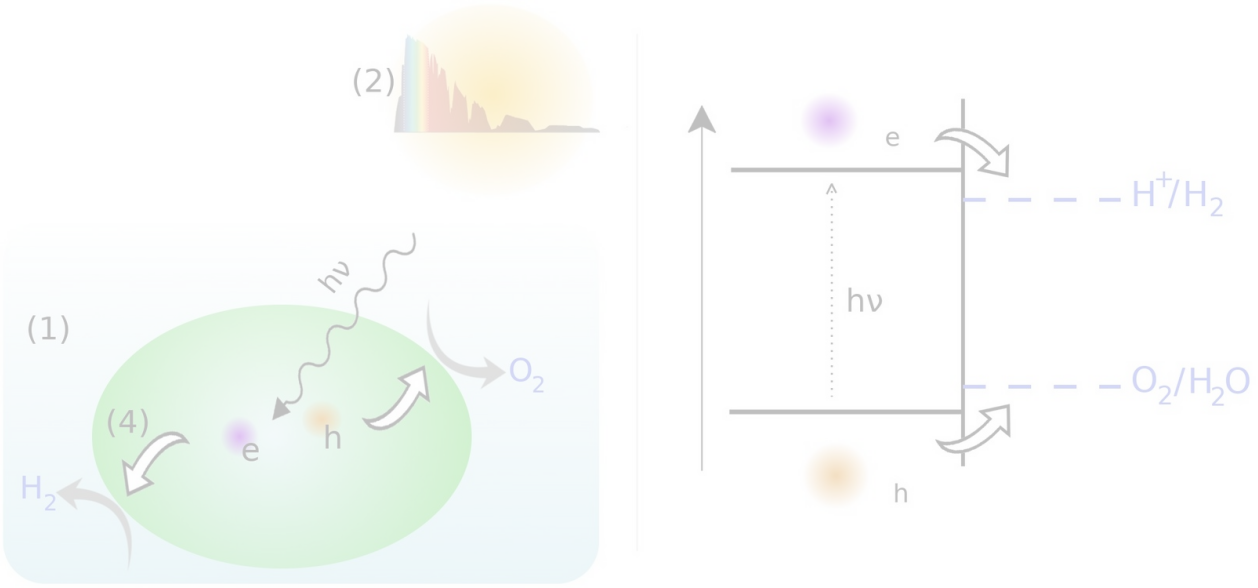
For each slide: what is the main point of the slide
what is the main point of the figure

# Water Splitting for Clean Fuel (with oxides)

Materials for photoelectrodes in **water splitting** offer a sustainable way of producing **clean fuels**




<u>An ideal material:</u>




(Minimum) Materials Criteria:

(1) **Stability** in aqueous environment

(2) **Band gap** in visible

(3) **Band edges** near reaction potentials

(4) Sufficient hole and electron **mobilities** *

Our materials system of choice is bismuth vanadate ($BiVO_4$)

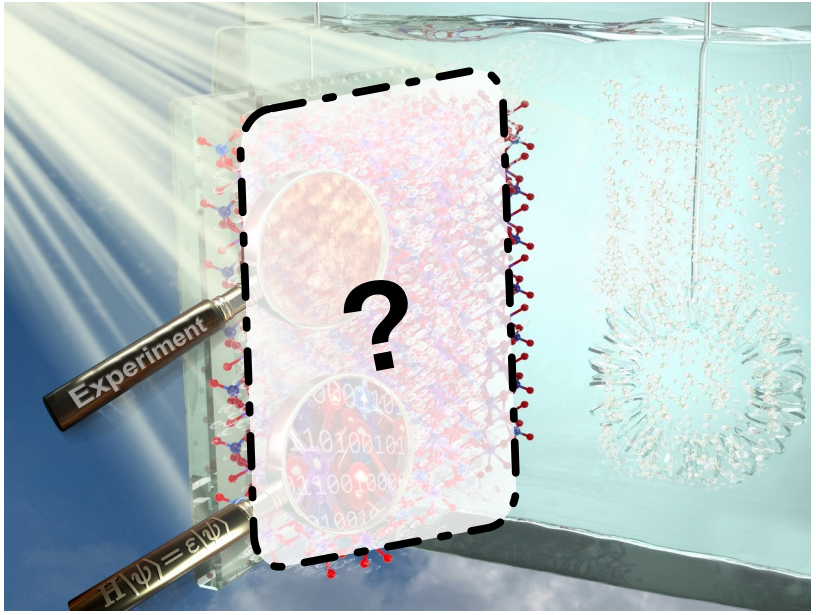
*W. Wang, et al. "The role of surface oxygen vacancies in $BiVO_4$." Chemistry of Materials. 32, 2899-2909 (2020).

# Keep it simple/Less is more

# Motivations: Interface- & Surface-driven phenomena

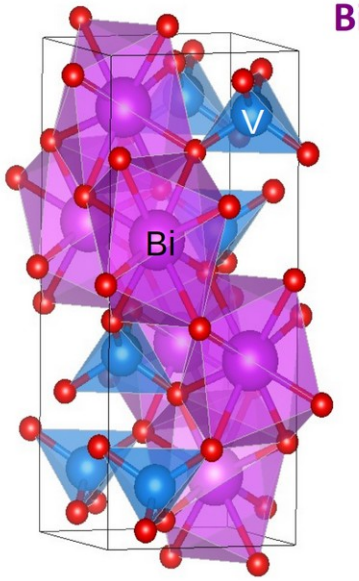
**What is the structure of the surface?**
**How does surface/interface influence photoelectrochemical activity?**
**What are the ways and signatures of water interacting with the surface?**

Reinforce main question with text and image (and speech)



# Use color to your advantage

## Why $BiVO_4$?




**$BiVO_4$ is an attractive photoanode for oxygen evolution**

| | |
|---|---|
| **Stable** | **against corrosion[1,2]** |
| Band gap | 2.4 – 2.6 eV [3,4,5,6] |
| **Band alignment** | **Favorable $^{w}$/ $H_2$ [3,7]** |
| **Synthesis** | **Many and varied; not $$[1]** |
| **$e^-$-$h^+$ yields** | **High, >70%[4]** |
| OER kinetics | Slow (requires co-catalyst) |
| Recombination | In bulk & surface (?) |

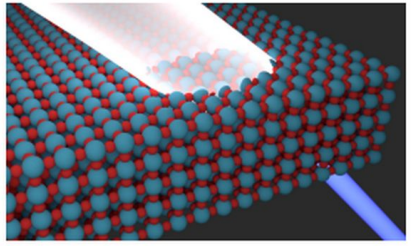
Interfacial phenomena

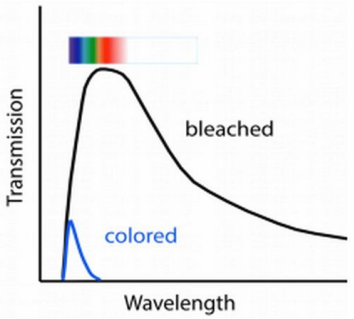
Good things in green
Bad things in red
Other things color coded

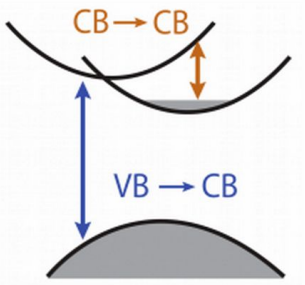

1) Y. Park, … K.S. Choi. *Chem. Soc. Rev.* **42**, 2321 (2013).
2) T.W. Kim and K.S. Choi. *Science*, **343**, 990 (2014).
3) M. Favaro, … R. van de Krol, D. Starr. *J. Phys. Chem. C*, **123**, 8347 (2019).
4) T.W. Kim,… G. Galli, K.S. Choi. *Nat. Comm.*, **6**, 8769 (2015).
5) D.J. Payne, … L.F.J Piper. *App. Phys. Lett.*, **98**, 212110 (2011)
6) M.V. Malashchonak, …A.V. Mazanik. *Mat. Chem & Phys.*, **201**, 183 (2017)
7) J.K. Cooper, … I.D. Sharp. *Chem. Mater.* **26**, 5365 (2014).

# Use color to your advantage

## Optical Absorption: Why & What






$$\varepsilon_2(\omega) \sim \frac{1}{\omega^2} \sum_{v,c} \int_{BZ} \frac{2d\boldsymbol{k}}{(2\pi)^3} \left| \boldsymbol{e} \cdot \boldsymbol{M}_{cv}(\boldsymbol{k}) \right|^2 \delta(E_c(\boldsymbol{k}) - E_v(\boldsymbol{k}) - \hbar\omega)$$

Large meshes needed — Transition exists

$$\boldsymbol{e} \cdot \boldsymbol{M}_{cv}(\boldsymbol{k}) = \langle \psi_{c,\boldsymbol{k}} | \mathbf{e} \cdot \mathbf{p} | \psi_{\mathbf{v},\mathbf{k}} \rangle$$

Transition strength

# Use color to your advantage

Using the school colors
https://brand.utexas.edu/identity/color/

| Color | Pantone® | CMYK | RGB/Hex |
|---|---|---|---|
| | PMS 159 | 0, 65, 100, 9 | 191, 87, 0<br>#bf5700 |
| | PMS 432 | 65, 43, 26, 78 | 51, 63, 72<br>#333f48 |
| | – | 0, 0, 0, 0 | 255, 255, 255<br>#ffffff |

| Color | Pantone® | CMYK | RGB/Hex | |
|---|---|---|---|---|
| | PMS 2011 | 0, 48, 99, 0 | 248, 151, 31 | #f8971f |
| | PMS 116 C<br>PMS 114 U | 0, 14, 100, 0 | 255, 214, 0 | #ffd600 |
| | PMS 2300 | 40, 0, 89, 0 | 166, 205, 87 | #a6cd57 |
| | PMS 2277 | 63, 0, 97, 20 | 87, 157, 66 | #579d42 |
| | PMS 320 | 96, 0, 31, 2 | 0, 169, 183 | #00a9b7 |
| | PMS 7469 | 100, 31, 8, 42 | 0, 95, 134 | #005f86 |
| | PMS 7543 | 24, 9, 8, 22 | 156, 173, 183 | #9cadb7 |
| | PMS 7527 | 3, 4, 14, 8 | 214, 210, 196 | #d6d2c4 |

# Make everything bigger

The quick brown fox jumps over the red dog.

The quick brown fox jumps over the red dog.

The quick brown fox jumps over the red dog.

The quick brown fox jumps over the red dog.

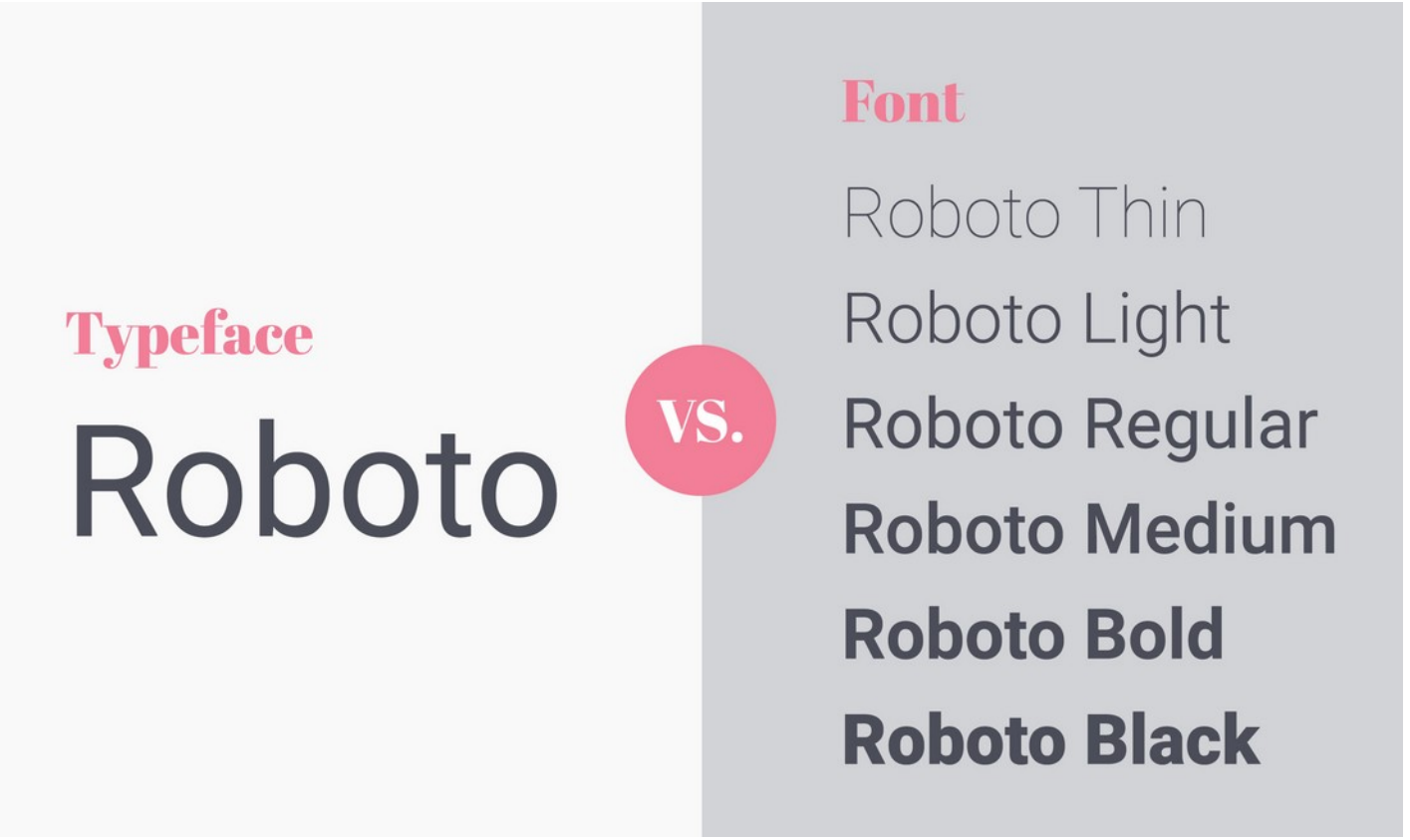
← Minimum font size: 18
Max number of font sizes: 3

The quick brown fox jumps over the red dog.

The quick brown fox jumps over the red dog.

An 80-year old person with bifocals sitting in the back of the room should be able to read it

# Typeface

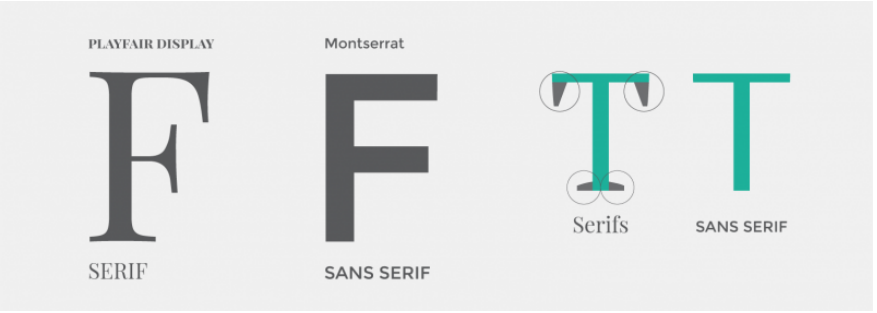



https://snowball.digital/blog/what-is-the-difference-between-a-font-and-a-typeface

# Typeface

Free from Google
https://fonts.google.com

“metrically compatible”




Short phrases
(presentations, posters, Flyers)

WW uses Calibri/Carlito frequently

| Sans serif | Serif |
|---|---|
| Tahoma | Times |
| Arial | Georgia |
| Verdana | Century |
| Trebuchet | Garamond |
| Gill Sans | Book Antiqua |

Block text
(papers, theses, proposals)

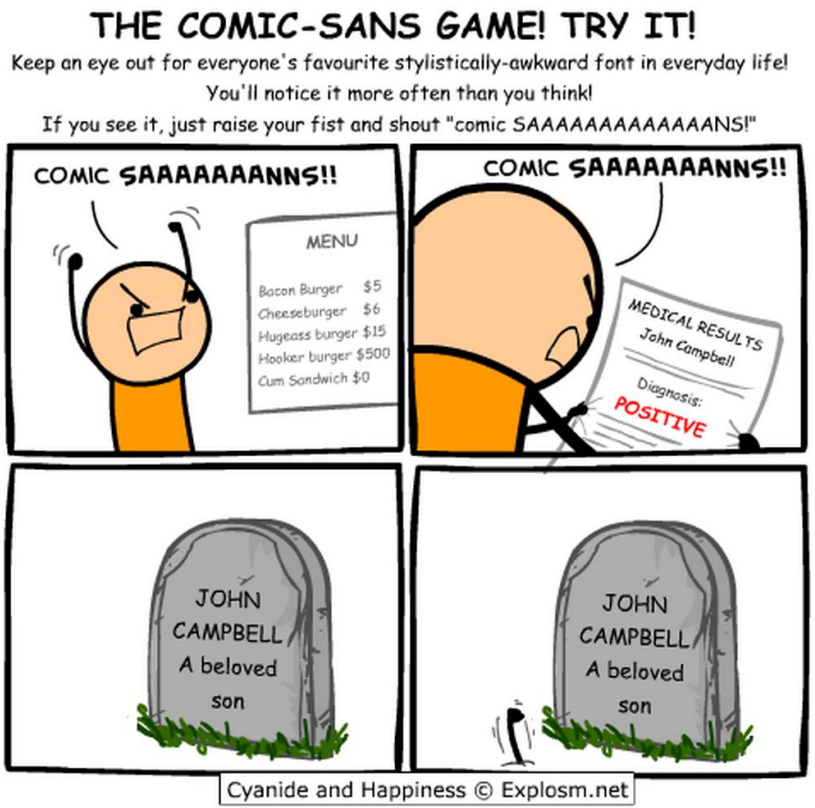
WW uses Cambria/Caladea frequently

http://sixminutes.dlugan.com/slide-fonts

# Typefaces


https://watchdocumentaries.com/helvetica/

# Typefaces




Comic Sans….please avoid


https://www.lingoapp.com/blog/comic-sans-the-innocence-and-hijacking-of-a-much-hated-type

# Practice, practice, practice

- Run through the presentation a few times until you are comfortable
- Get the timing down
  - Leave time for Q&A
  - Figure out how much time it takes for you to go through a slide
  - On average about 1.5–2min per slide, depending on density

# Learn to speak extemporaneously

- Prepare notes ahead of time
- Avoid speech fillers: “um”, “like”, “so”, etc.;
- Pauses are totally fine! They always feel longer as a speaker
- Don’t get caught on speech flubs- they happen a lot, but they will stick out to you much more than anyone in the audience; no one will remember
- Practice in front of a mirror or record yourself

# Eye contact and gestures

Make eye contact in different places in the audience
(or with the camera on video conferencing)

Gestures for emphasis

Hands and arms at rest at the side by default (feels weird, looks natural)
or...

“Merkel Raute”

# Compress images where needed

- Make sure your images are portable/editable
  → paper, presentations, curation
- 600 dpi (dots per square inch) → high-resolution
- 300 dpi → publication quality
- 96-150 dpi → projector quality
- Raster images (bitmap, pixels): distortion when enlarged
  - JPG (lossy compression, less memory)
  - PNG (lossless compression, more memory)
- Vector image (geometric forms): clear resolution at any size
- Files on the order of 10s MBs

Image compression in powerpoint

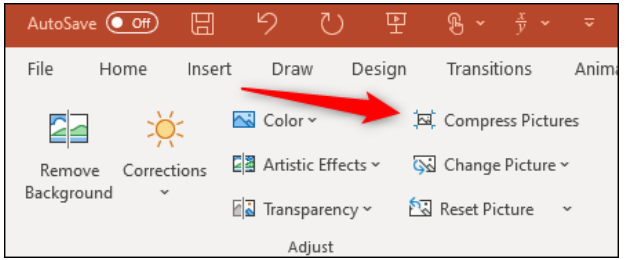
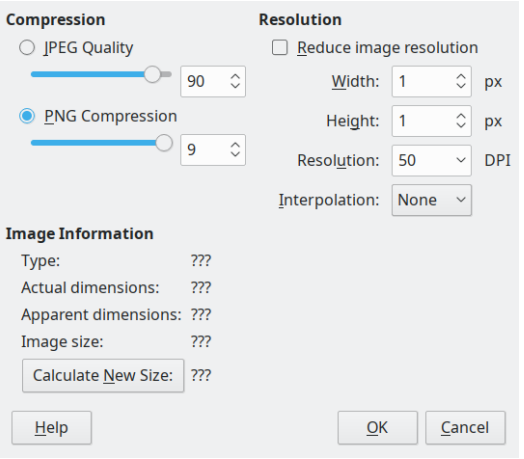



Image compression in LibreOffice



# Have backup slides ready

All the things you could not fit in the talk time-

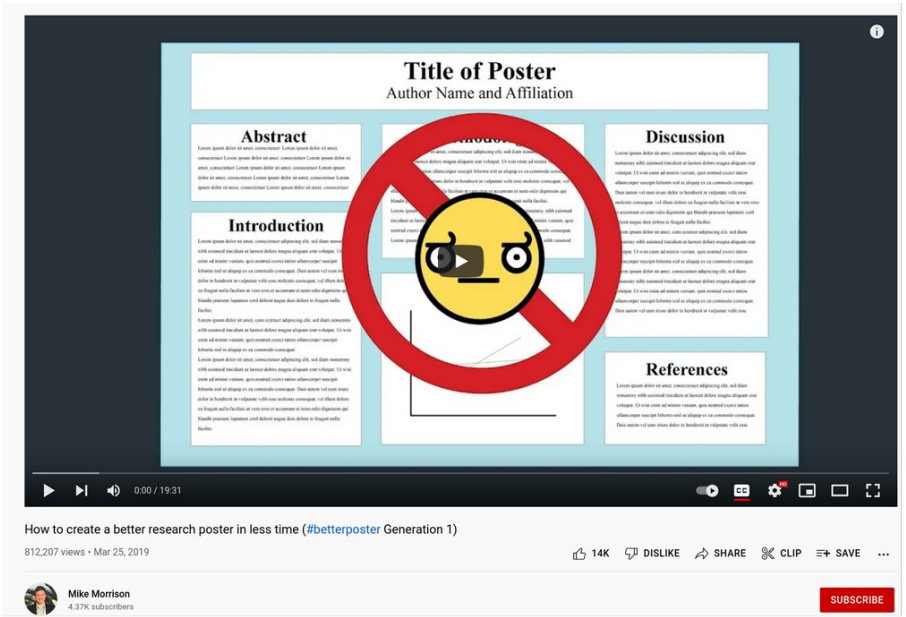
You'll discover what you actually present
is a fraction of the actual work involved
You will pick and choose what is relevant to present based on
the anticipated audience
the type of conference
the overall message you want to communicate

e.g., dissertation: ~35 slides, 20 backup

# Find your style

Experiment and try new things!

# Aside: Making posters

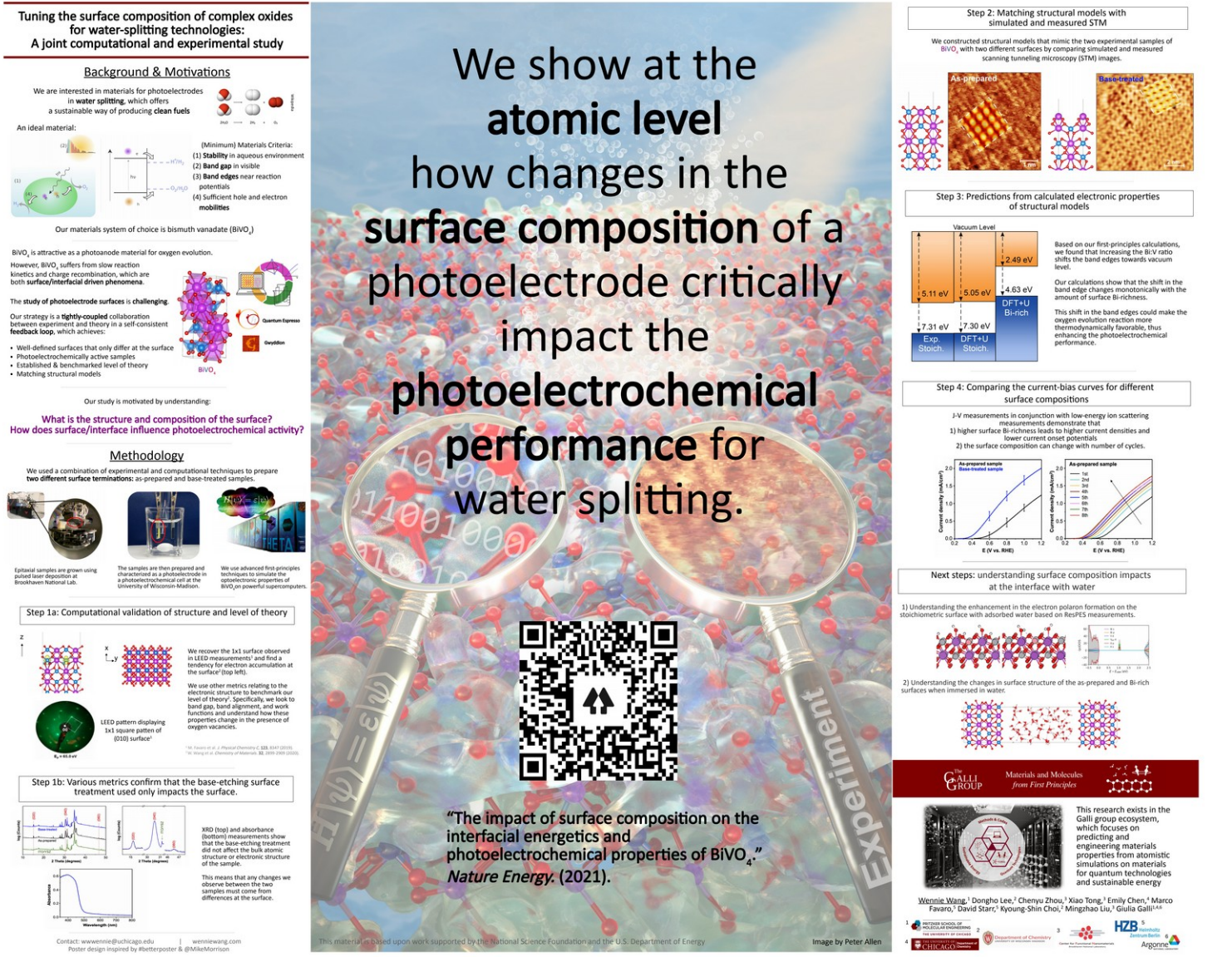



https://www.youtube.com/watch?v=1RwJbhkCA58


https://www.youtube.com/watch?v=SYk29tnxASs

Also great insights into how to work with natural human biases/psychology

An example of the #betterposter format



# Guidelines for journal club

Types of topics
- Tutorials on a specific technique
- Methodology developments
- New physics or chemistry
- Studies that revisit published results

Identifying a topic
- Relevant (tangentially or directly) to participating members?
-

Where to start:
- Review or perspective or accounts
- High-impact/flagship journals

What to include in a journal club presentation
- Sufficient background/context
- Motivations of the paper
- What did they find?
- How did they find it? (Use figures, tables; keep in mind methodology)
- 1-2 main points you want people to remember

As an audience
- Think about connections to your own research
- Come prepared to ask questions