

الإمام طريق  
الاكتشاف  
Through Inspiration, Discovery

جامعة الملك عبد الله  
للعلوم والتقنية  
King Abdullah University of  
Science and Technology



# How to make good research posters

# First thing's first



## WHO IS YOUR AUDIENCE?

- General public;
- Non-specialists;
- Specialists.



# What is a research poster?



- A simplified, visual representation of your work;
- It highlights major achievements / discoveries.

# What is its purpose?



A poster is all of the following:

- An informative snapshot of your work;
- An advertisement of your communication abilities;
- A recruitment tool.



# What makes a good poster?

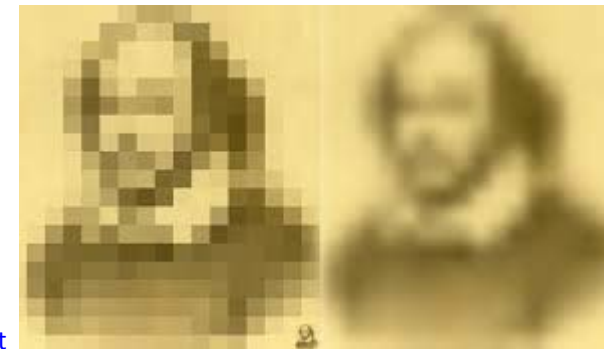


- The right proportions;
- Easy flow;
- Good background and text color choice;
- Big (enough) font;
- Relevant, to-the-point text.

# What makes a bad poster?



-  or  background;
- Crammed text and figures;
- Pixilated images and graphs;
- References in the abstract;
- Incon**ci**stencies;
- Speling mistakes;
- Small or unusual font.



# The components



- Title –capture the audience;
- Authors and their affiliations;
- Abstract – brief, informative, no references;
- Introduction – background information, outlines the problem / states the aim of the study;

# The components (continued)



- Methods –only relevant methods and materials;
- Results – only the exciting and novel results;
- Conclusion – succinct, may include future work;
- Acknowledgements – sponsors and anyone who helped on the project;
- References – no more than five.



# A picture paints a thousand words



- Those words are positive if you choose the right graphics or illustrations;
- ...or negative if you neglect the basics:
  - Bad resolution;
  - Forget units on the graph;
  - Font size that is too big or too small;
  - Color choice that makes text unreadable.

# The poster is ready, now what?



- Edit, edit, edit;
- Give it to a friend to edit.

(personal versus position) power model (e.g., Bass 1960, Etzioni 1961, Yukl and Falbe 1991). Power has also been recognized as a property of the social relations that entail ties of mutual dependence between parties (Emerson 1962). However, neither the five-dimension nor the two-dimension power typology captures the full effects of the power that is embedded in a relationship between an agent and his/her target. For example, neither typology explains why a person without position or personal power can sometimes convince other people to comply with a job request or why another person with position or personal power may not achieve the same effect by making the same request.

Virginia Unkefer 9/23/11 9:07 AM

Deleted: they cannot

Virginia Unkefer 9/23/11 9:14 AM

Comment: But is a typology meant to explain? A typology creates categories and describes; does a typology have to explain???

Virginia Unkefer 9/23/11 9:07 AM

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Virginia Unkefer 9/23/11 9:15 AM

Comment: I think I would delete this sentence here. It actually feels like you are trying to describe guanxi without saying that that is what you are doing. Also, without this sentence, there is logical flow to the next paragraph.

# Presenting the poster

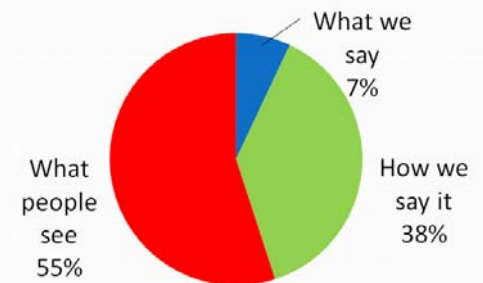


- No more than three minutes;
- Answer these three questions:
  - What was the point of the study (the aim)?
  - What did you find (results)?
  - Why is your work relevant / how is it applied (conclusion)?

# What else?



- Body language – speak to the audience, making reference to the poster;
- Tone – confident, unassuming;
- Dress code – smart casual;
- Practice makes perfect.



# Examples of good posters



## Wastewater treatment, energy recovery and desalination using a forward osmosis membrane in a microbial osmotic fuel cell

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<sup>2</sup>Pennsylvania State University, USA

### ABSTRACT

Microbial osmotic fuel cells (MOFCs) are an integrated technology with the potential to simultaneously treat wastewater, generate electricity and desalinate seawater (F2). The technology is based on a microbial fuel cell (MFC) integrated with forward osmosis (FO). Laboratory tests have shown that a MOFC produces more power than MFCs with ion exchange membranes. In addition, a 35% desalination of seawater was achieved by water transport through the membrane.

### INTRODUCTION

Water reuse and desalination are the only means of increasing the available supply of fresh water (4), and thus are essential for meeting the increasing global demand for fresh water. Conventional desalination and wastewater treatment technologies are intensely energy consuming. Reducing this energy consumption is essential for developing a sustainable water infrastructure.

MOFCs have a FO membrane between the electrodes (Fig. 1) and a wastewater solution is circulated through the cathode chamber. The design enables water recovery and subsequent seawater dilution. By incorporating an air-cathode, the requirement for aeration to sustain the cathodic reaction that would otherwise offset the power generation, is eliminated.

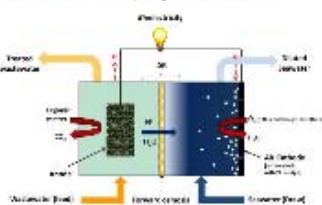


Fig. 1. Schematic of an air-cathode microbial osmotic fuel cell.

The objective of this study was to investigate an integrated MFC and FO process that does not require aeration to achieve wastewater treatment, energy recovery, and water desalination. The integrated system was compared to MFCs with ion exchange membranes to evaluate performance (Fig. 2).

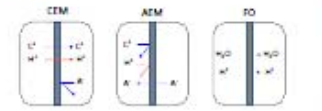


Fig. 2. Separation mechanisms for each of the membranes used in the study. CEM = cation exchange membrane, AEM = anion exchange membrane, FO = forward osmosis membrane.

Acknowledgments: This work was sponsored by a PhD fellowship, a Global Research Partnership Collaborative Fellow award, and award IAB-11-053-13 from the King Abdullah University of Science and Technology (KAUST). Special thanks to Victor Vargas-Quintero, Zhen-Yu Li and Rodrigo Velasco-Lizaso for their helpful comments and suggestions.

### RESULTS

Figures 3, 4 and 5 show the performance of the systems tested with respect to current generation, power density and water flux, respectively.

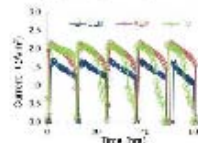


Fig. 3. The MOFC produced more current than the MFC with a CEM and comparable results with the MFC using an AEM.

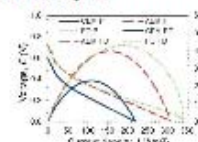


Fig. 4. The MOFC produced higher power densities than MFCs with either a CEM or AEM.

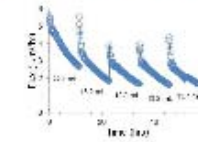


Fig. 5. Water flux through the FO membrane resulted in dilution of the wastewater solution. This diluted stream could be further treated by reverse osmosis at a reduced energy demand, a key benefit to seawater desalination technology.

### CONCLUSIONS

The MOFC with an air-cathode demonstrated the following:

- good removal of organics (75%)
- effective indirect desalination (35%)
- enhanced current and power generation (43 W/m<sup>2</sup>) when compared to MFCs with an AEM (40 W/m<sup>2</sup>) or CEM (23 W/m<sup>2</sup>).

### References

1. Zhang, P., Roshal, K. R. and He, Z. (2011), *Review: Sci Technol Adv* 5(1):680-698
2. De, T., Peng, Q. Tian, J. and He, Z. (2012), *Desalination* 312: 10-18
3. Werner, C.M., Logan, B.E., Saikaly, P.E. and Amy, G.L. (2013), *J. Water, Air, Soil Pollut.* 184: 118-122
4. Bhattach, S.A., Rubin, P.M., Brinckman, M., DeGuzman, J.D., Malins, R.J. and Mayer, A.M. (2006), *Nature* 442: 321-323

## High Pressure Soot Characterization

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<sup>1</sup> King Abdullah University of Science and Technology  
<sup>2</sup> North Carolina State University

### MOTIVATION

Many combustion devices, such as diesel and gas turbine engines, operate at high pressure to increase thermodynamic efficiency. While more efficient, this can result in increased NO<sub>x</sub> and soot formation. Soot is a known carcinogen, and reducing emissions is of critical importance. Although combustion devices often operate at elevated pressures, experimental difficulties have resulted in very little high pressure soot research. Our goal is to better understand the soot formation processes, from inception to growth, to oxidation, and how they are affected by pressure.

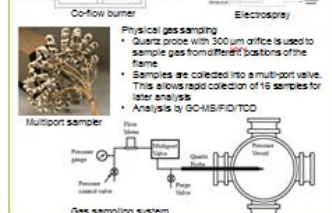
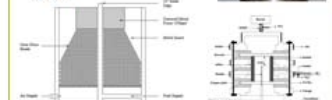


(2) Diluted ethylene flame at 1, 2, 4, 8, 12, and 16 atm with constant fuel flow

### EXPERIMENTAL APPARATUS

High pressure vessel  
 • Rated for 50 atmospheres of pressure  
 • Four ports for optical and probe access  
 • Stepper motor for precise flame positioning  
 • Electrode array allows homogeneous vaporization of multi-component liquid fuels (such as diesel and jet fuel)

Laminar co-flow diffusion flames  
 • Laminar flames allow spatial resolution not possible in turbulent flames  
 • Turbulent flames present in real combustion devices can be mimicked as sets of laminar flamelets



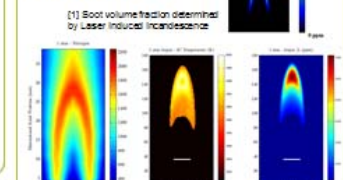
### PRESSURE DEPENDENCE OF HYDROCARBON SPECIES

Among in-flame gaseous species, poly(cyclic aromatic hydrocarbons (PAHs)) are of particular interest as these are important soot precursors. Soot precursor species, like total soot, show a power dependence on pressure. Relative species concentrations at a given flame height are also seen to change with pressure, indicating a change in dominant reaction pathways.



### CURRENT AND FUTURE WORK

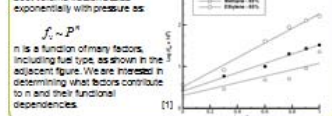
- Laser Extinction/Scattering
- Laser Induced Incandescence
- Laser Induced Fluorescence
- Thermogravimetric sampling of soot particles
- Two-Color Thermometry
- Spectral Soot Emission
- Physical gas sampling



(1) Soot volume fraction determined by Laser Induced Incandescence  
 (2) Gas temperature measured by thermocouple  
 (3) Soot surface temperature and volume fraction determined by two-color thermometry

### PRESSURE DEPENDENCE OF SOOT VOLUME FRACTION

Previous research has shown that soot volume fractions scales exponentially with pressure as:



$f_v \sim P^n$   
 n is a function of many factors, including fuel type, as shown in the adjacent figure. We are interested in determining what factors contribute to n and their functional dependencies.

### REFERENCES

- 1) L. L. McCrain and W. L. Roberts, *Combustion and Flame*, (2009)
- 2) R.K. Ashjaee, K. Kalscheuer, et al., *Proc. Combust. Inst.* (2012)
- 3) R.K. Ashjaee, K. Kalscheuer, et al., *Combust. And Flame* (2012)

Acknowledgments: Portions of this work were funded by the U.S. Army Research Laboratory and U.S. Army Research Office under grant W81XWH-10-1-0118

# Further reading



- <http://www.stanford.edu/group/blocklab/dos%20and%20donts%20of%20poster%20presentation.pdf>
- <http://www.kmeverson.org/academic-poster-design.html>
- <http://www.cns.cornell.edu/documents/ScientificPosters.pdf>

Through  
Inspiration,  
Discovery

Thank You