

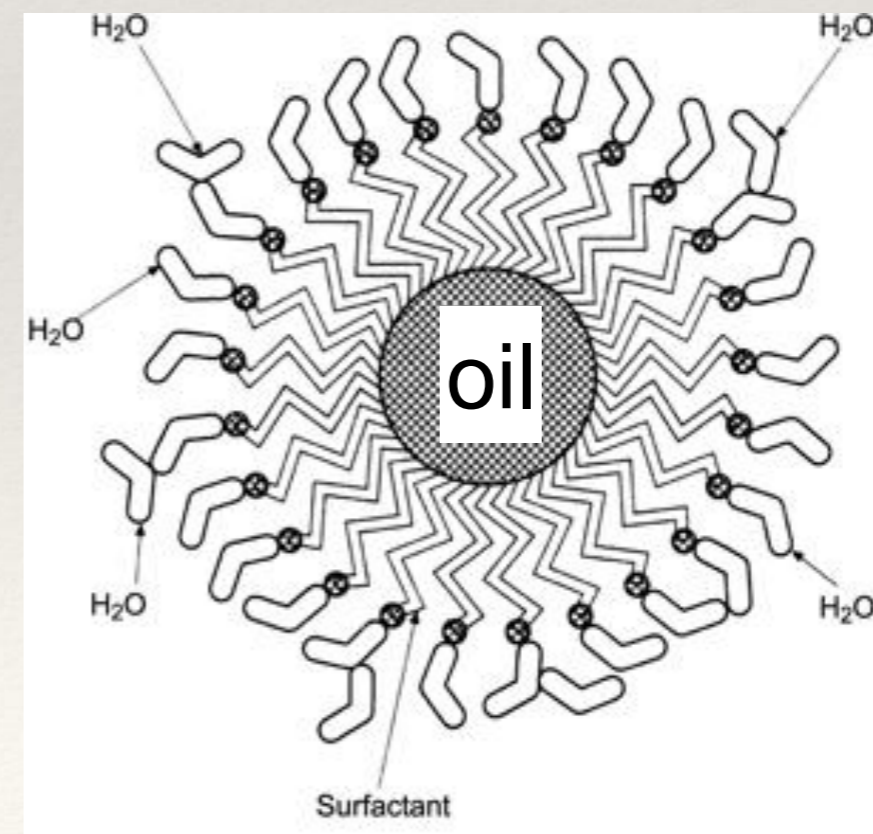
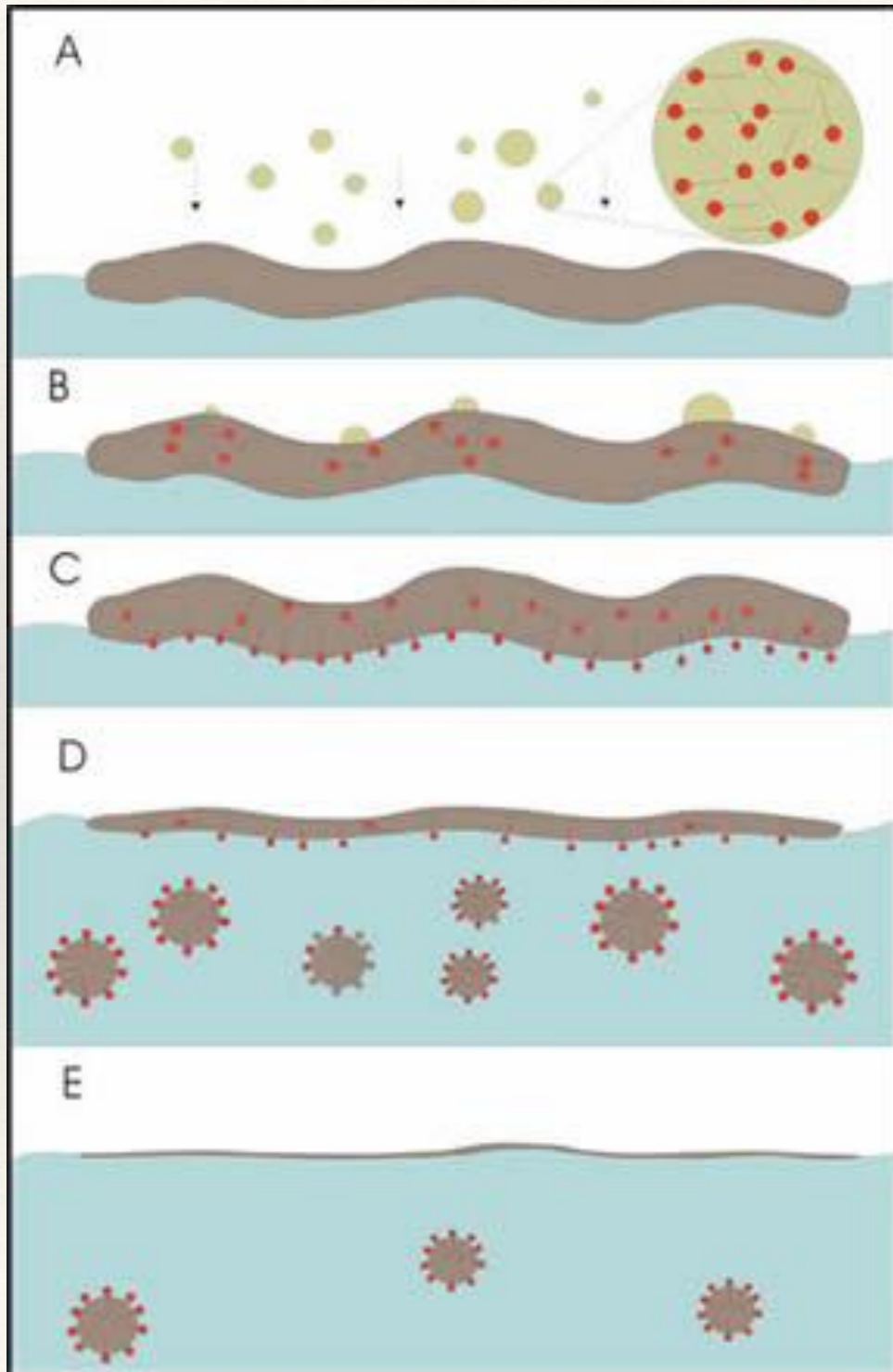
SNO 2013

Effects of Dendrimer Oil Dispersants on *Dictyostelium discoideum*

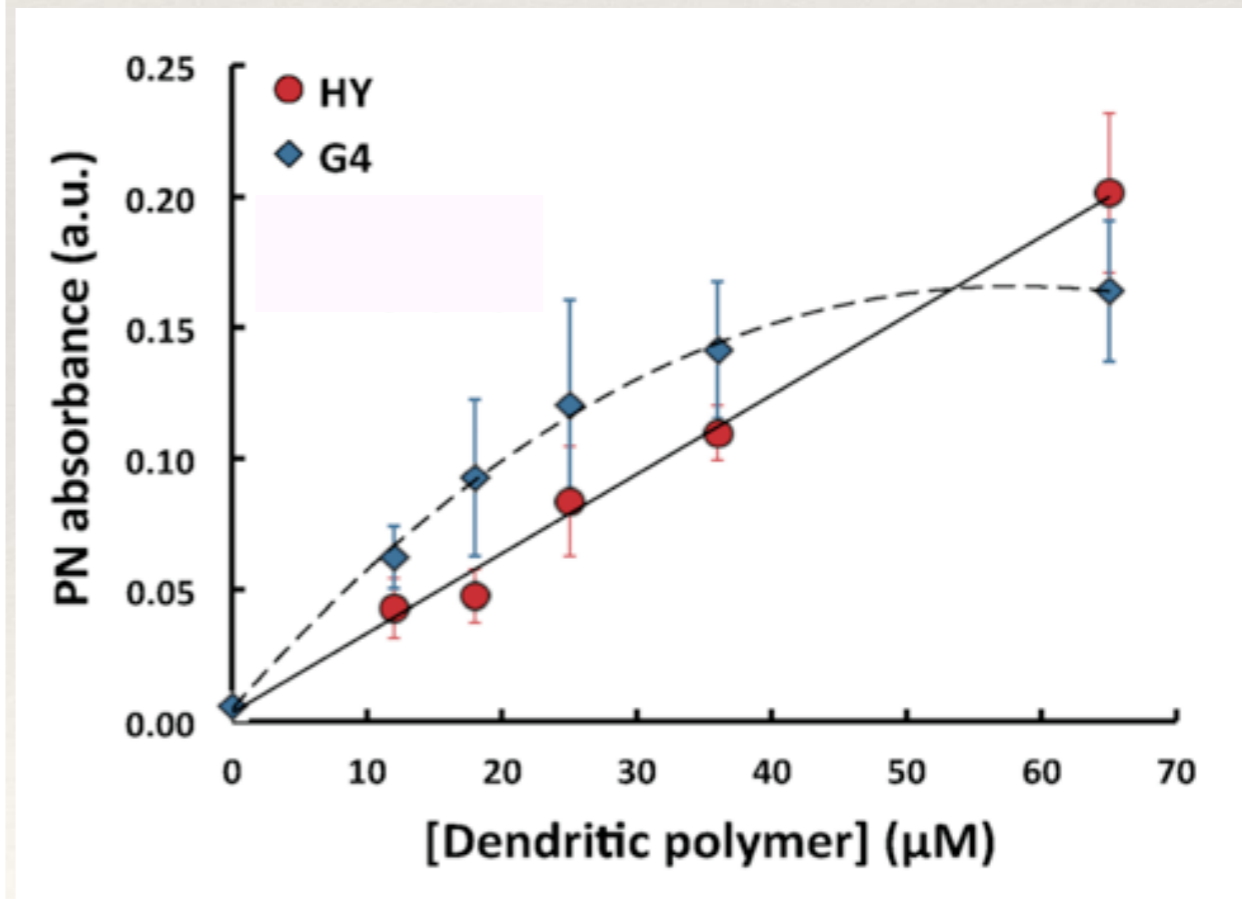
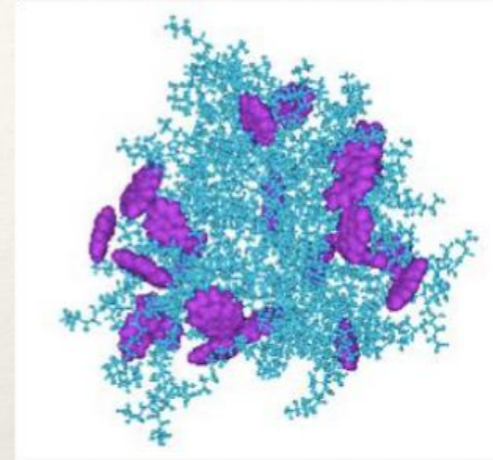
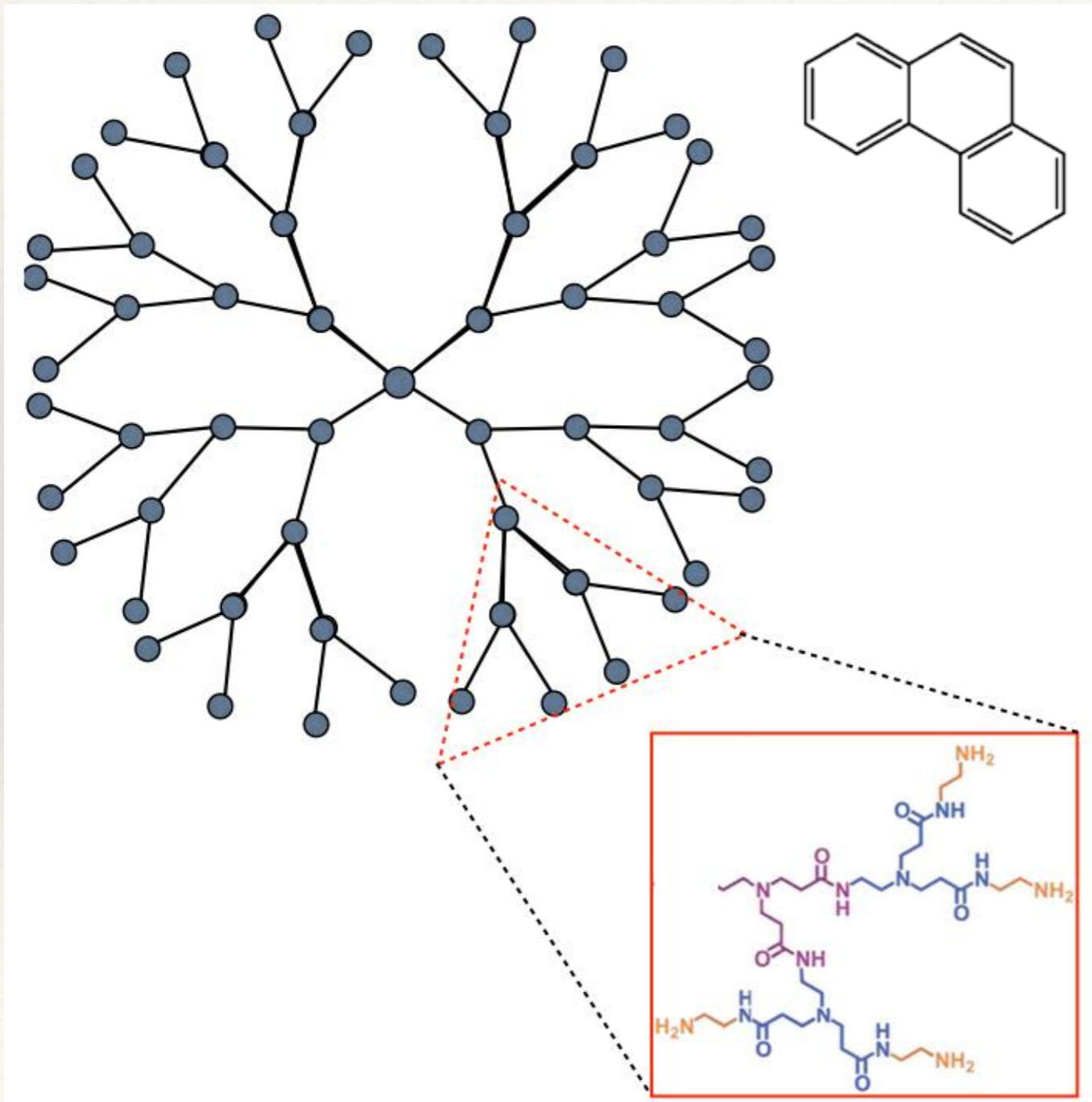
N Geitner, R Powell, T Bruce, D Ladner, F Ding and P-C Ke

Department of Physics and Astronomy

Motivation: A Friendlier Oil Dispersant

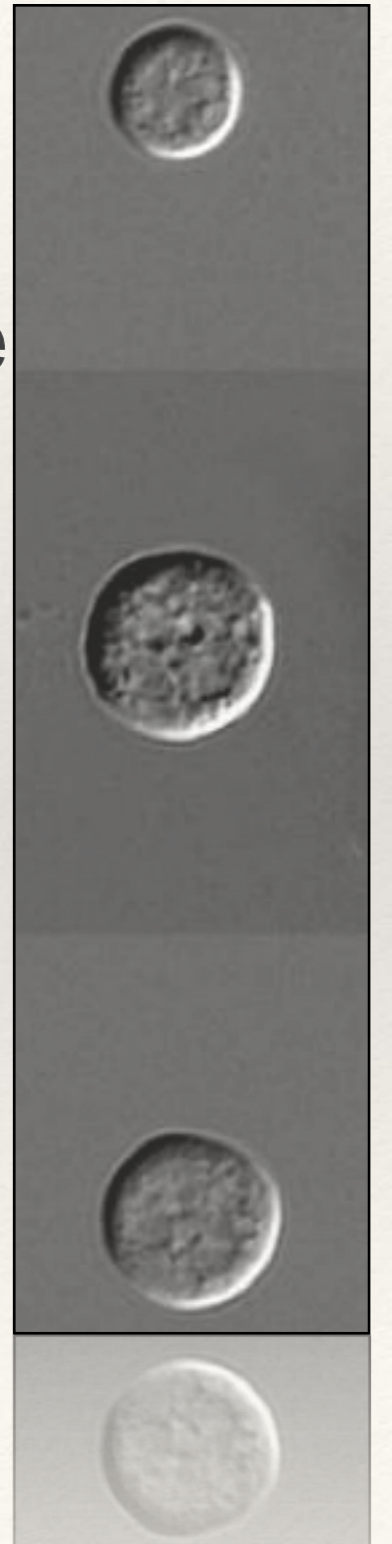


Dendrimer Oil Dispersants



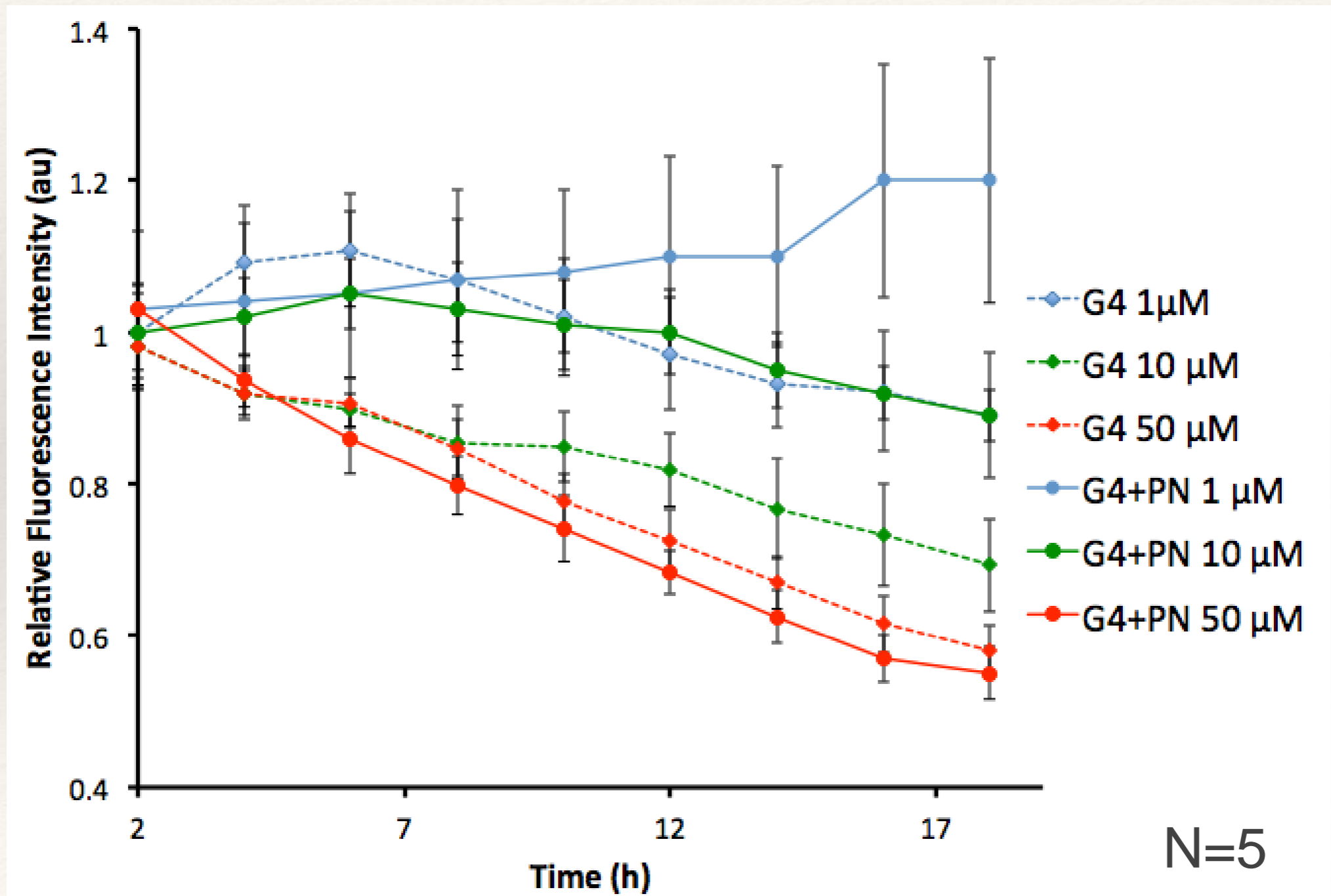
Aims and Techniques

- ❖ Assess G4-PAMAM(NH₂) toxicity \pm Phenanthrene
 - ❖ Culture proliferation
 - ❖ Cell membrane potential
 - ❖ Visualization of labeled dendrimers within cells
 - ❖ Cell-association kinetics

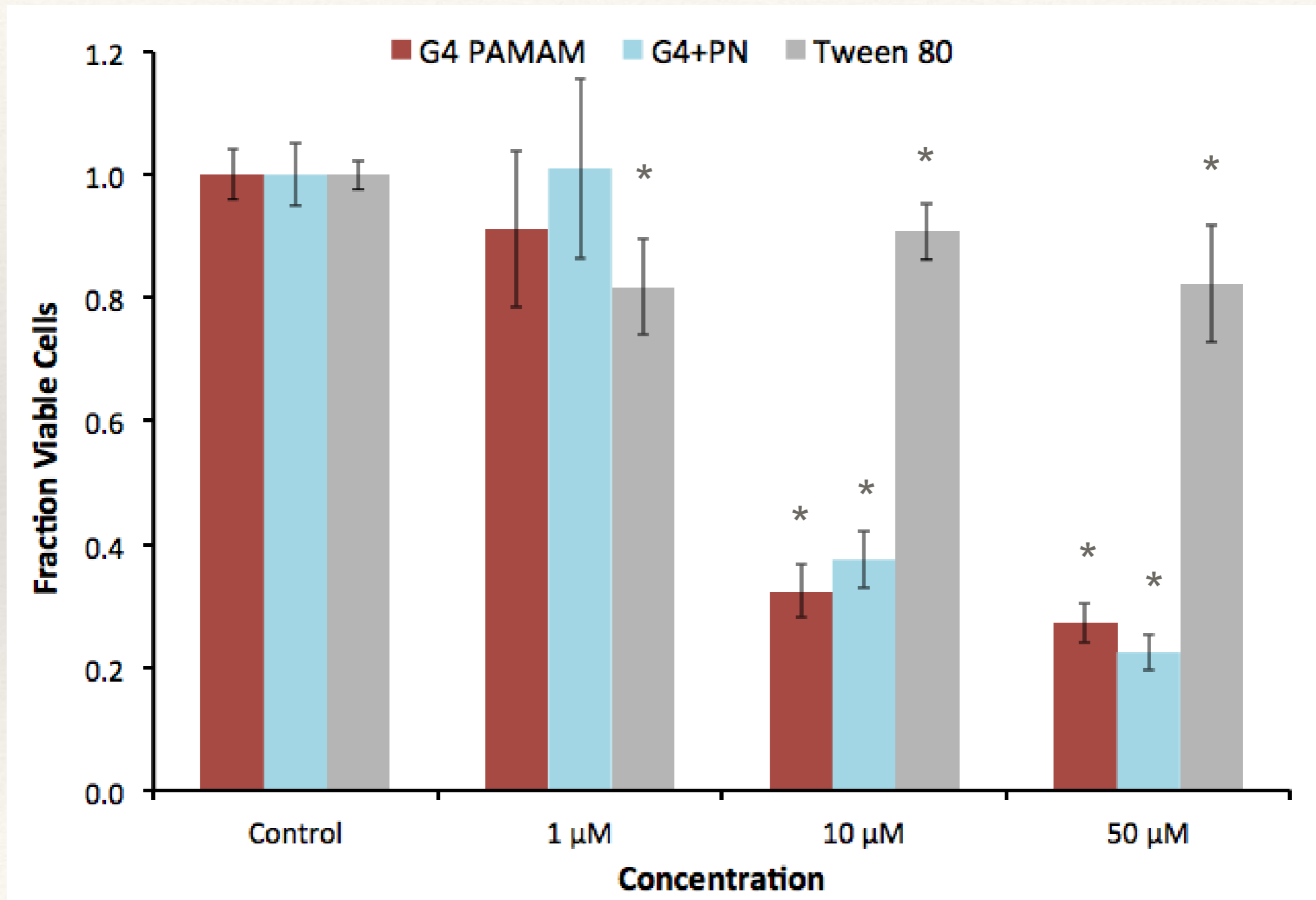


Amoeba Culture Proliferation

Normalized Fluorescence Proliferation Assay

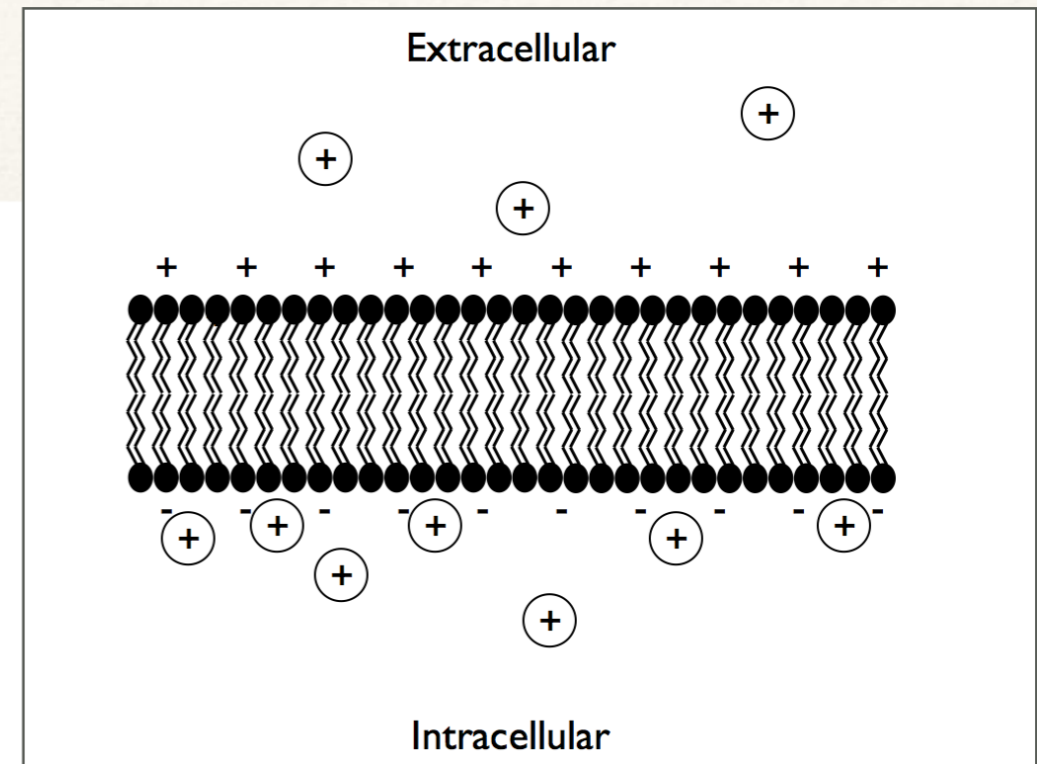
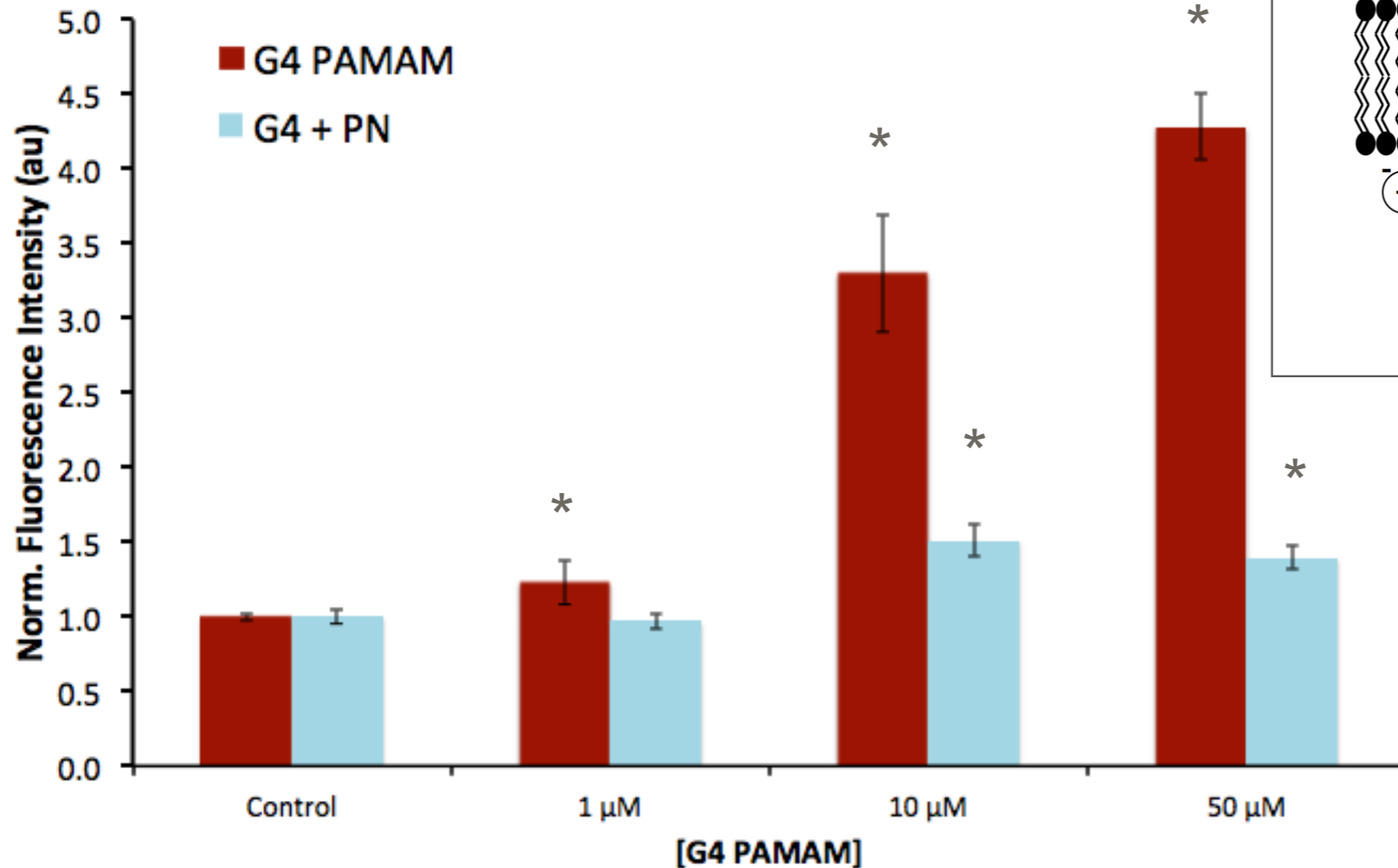


Amoeba Culture Proliferation: 24h

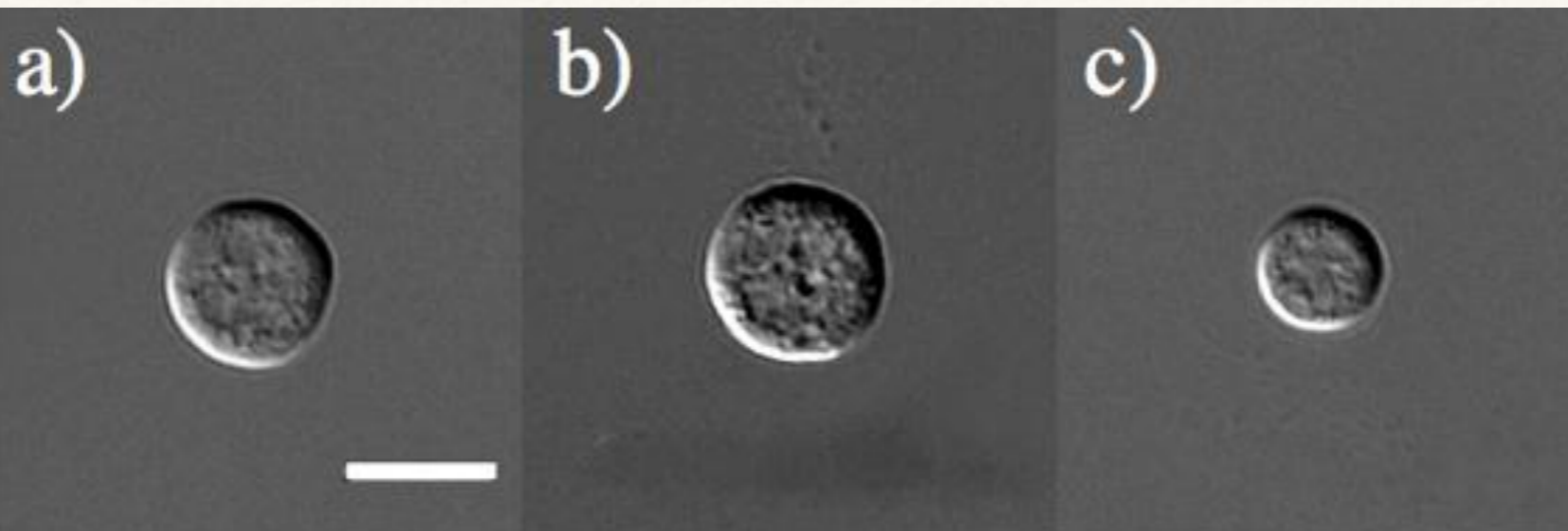


Membrane Potential

Physical Effect of Cationic Dendrimers

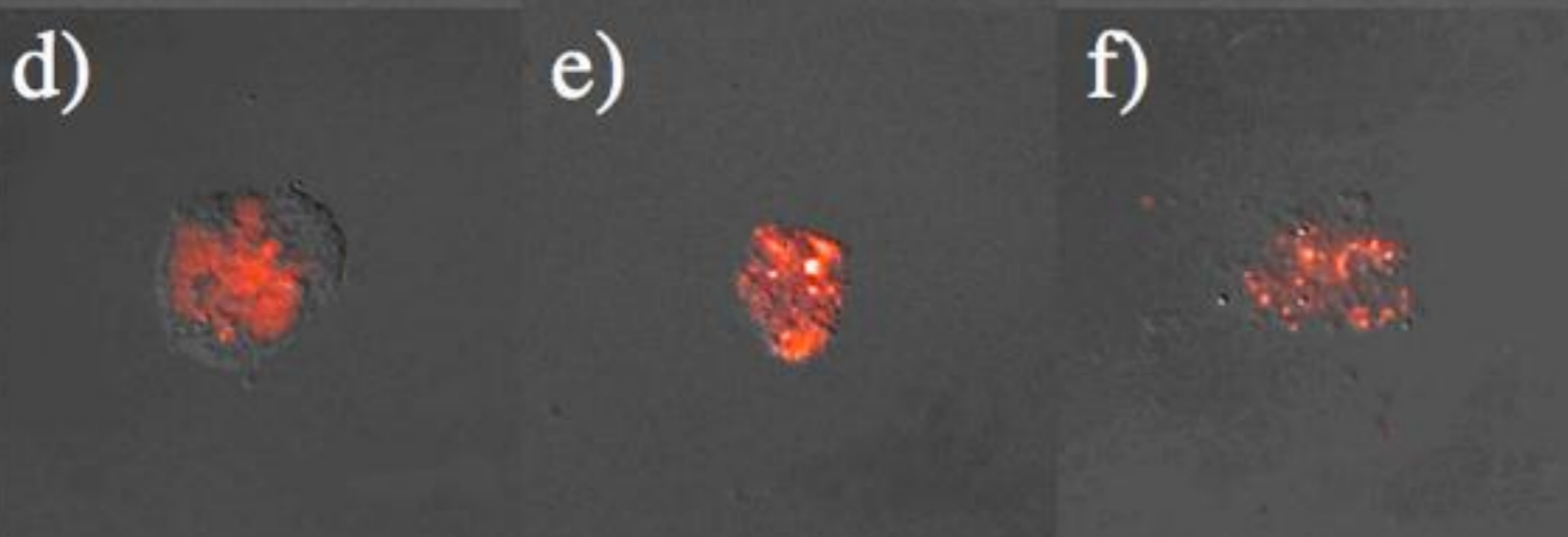


Control



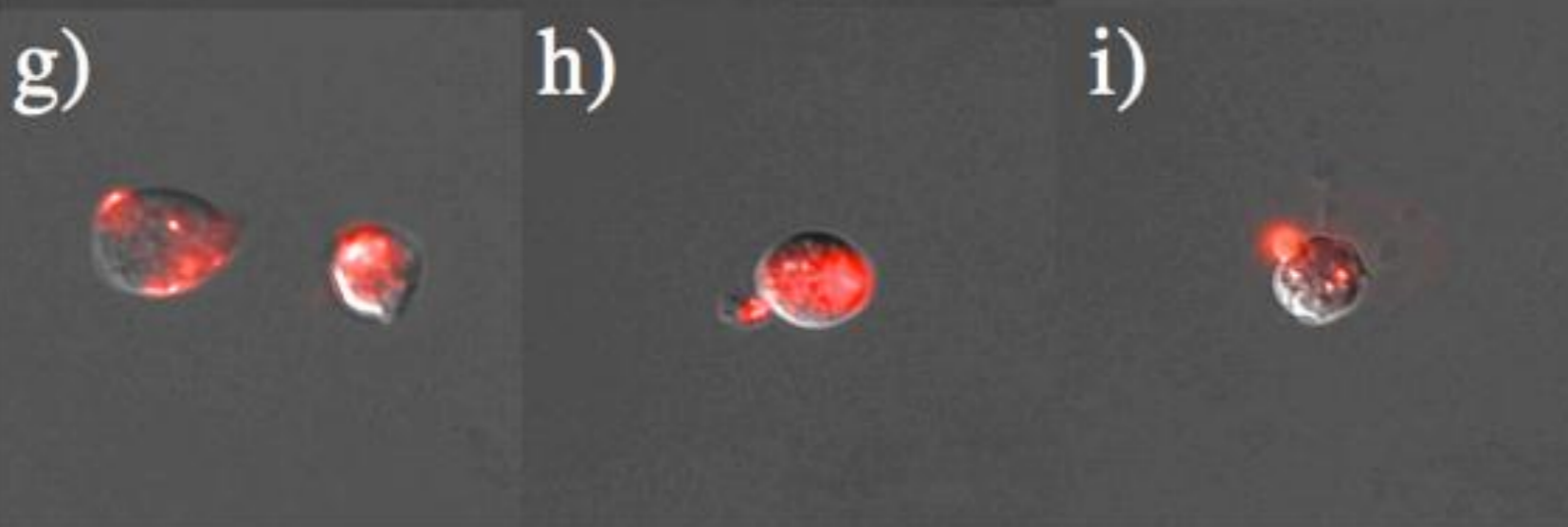
*Scale:
10 μ m*

*G4
Dendrimers*



*20 million
Dend/cell/min*

G4+PN



*1 million
Dend/cell/min*

Conclusions and Ongoing Work

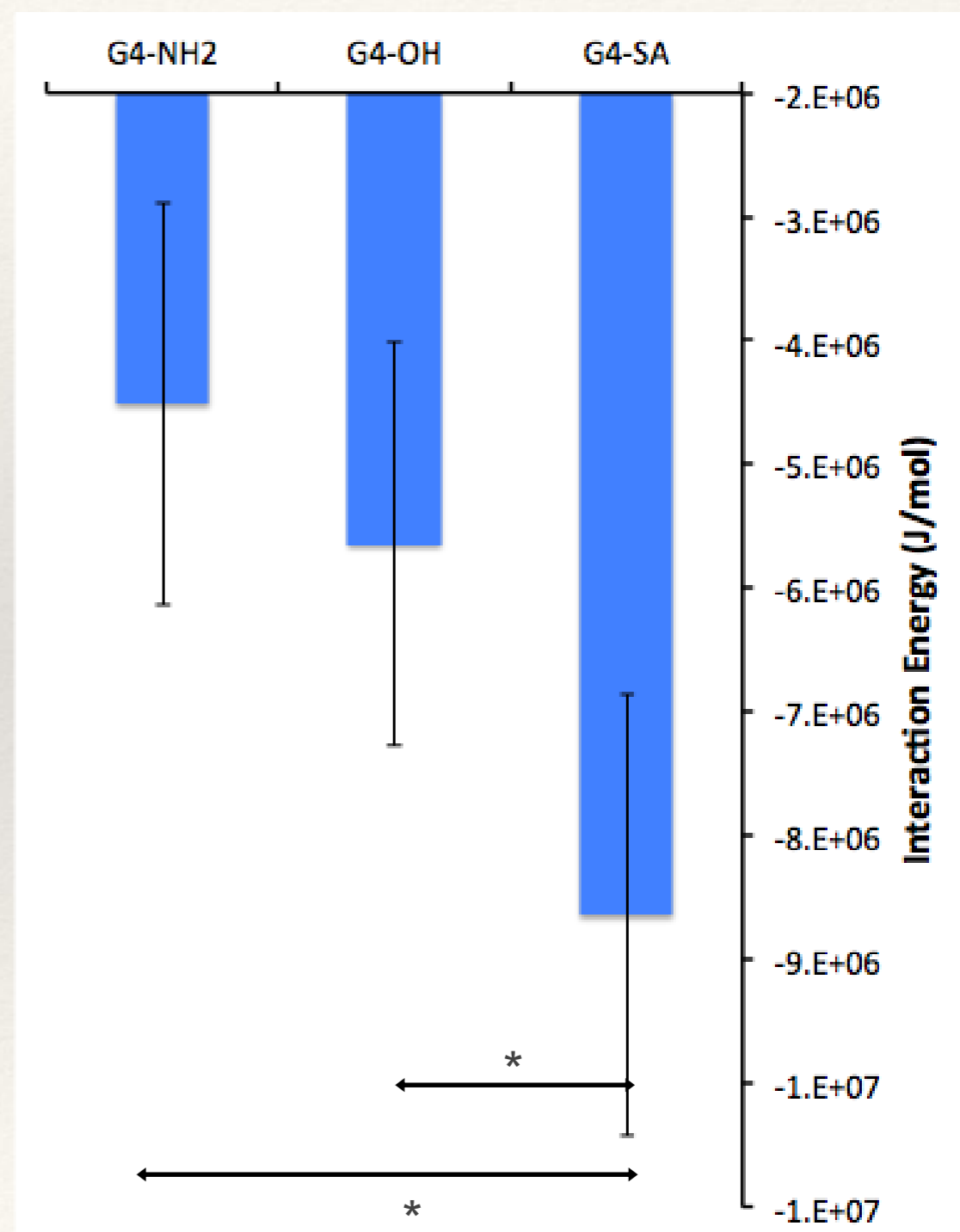
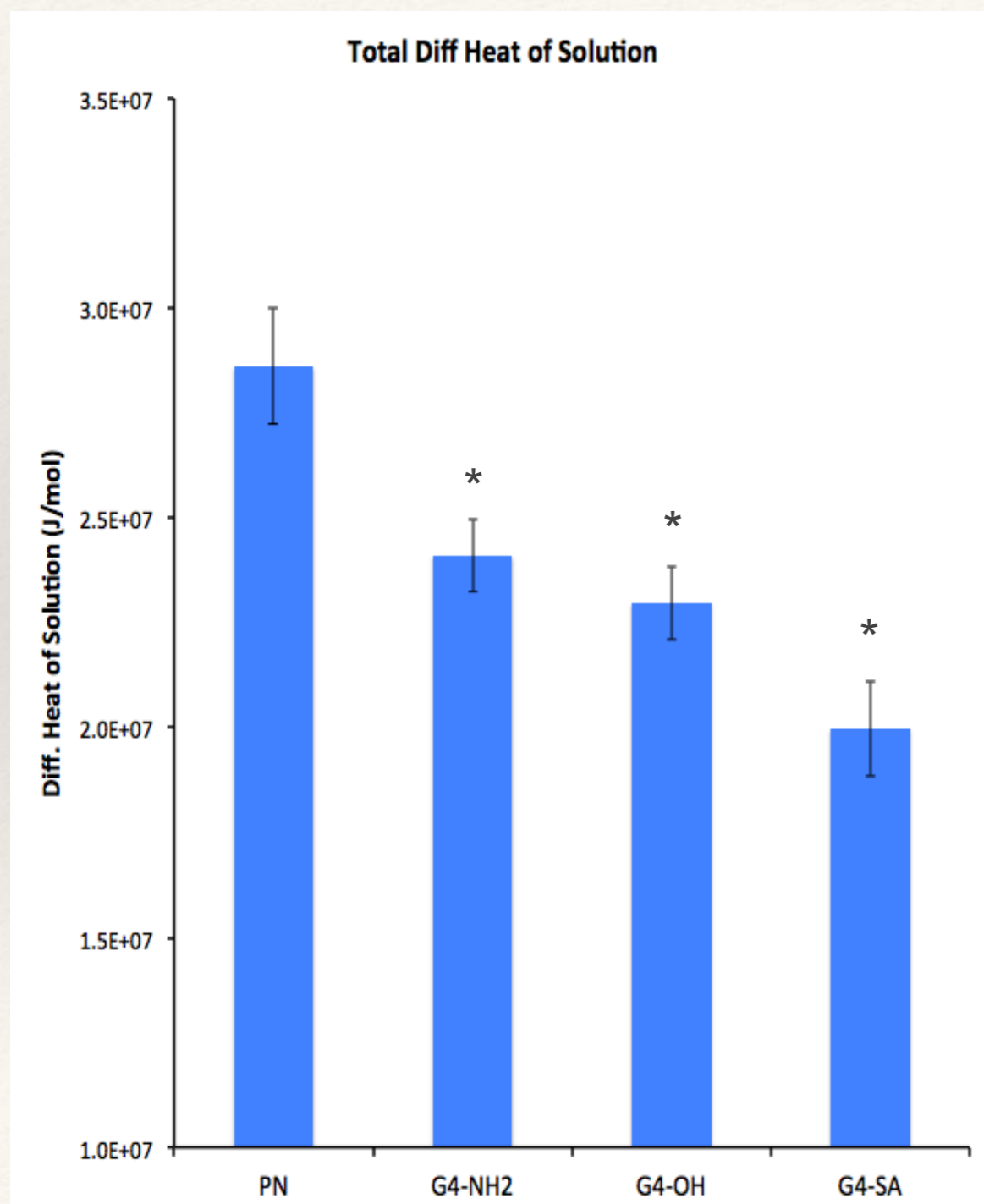
- ❖ G4-PAMAM(NH₂) dendrimers non-toxic to studied amoeba at low (<10μM) concentrations, toxic at higher
- ❖ Toxicity caused by uptake and resulting membrane depolarization
- ❖ Uptake and resulting toxicity reduced by presence of phenanthrene
- ❖ Examination of varying surface functionality

Acknowledgements

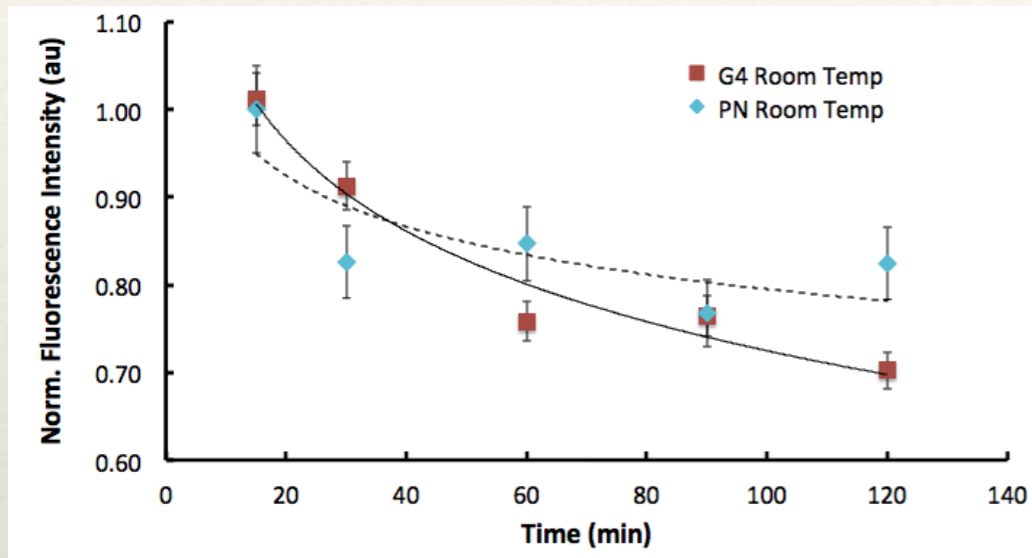
- ❖ Dr. Pu-Chun Ke
- ❖ Dr. Feng Ding
- ❖ Dr. David Ladner
- ❖ Slaven Radic
- ❖ Rachel Andorfer
- ❖ Rhonda Powell
- ❖ Bo Wang
- ❖ Xinwei Ge
- ❖ Praveen Nedumpully
- ❖ Clemson Light Imaging Facility
- ❖ Shameless Plug: Looking for PostDoc Position!



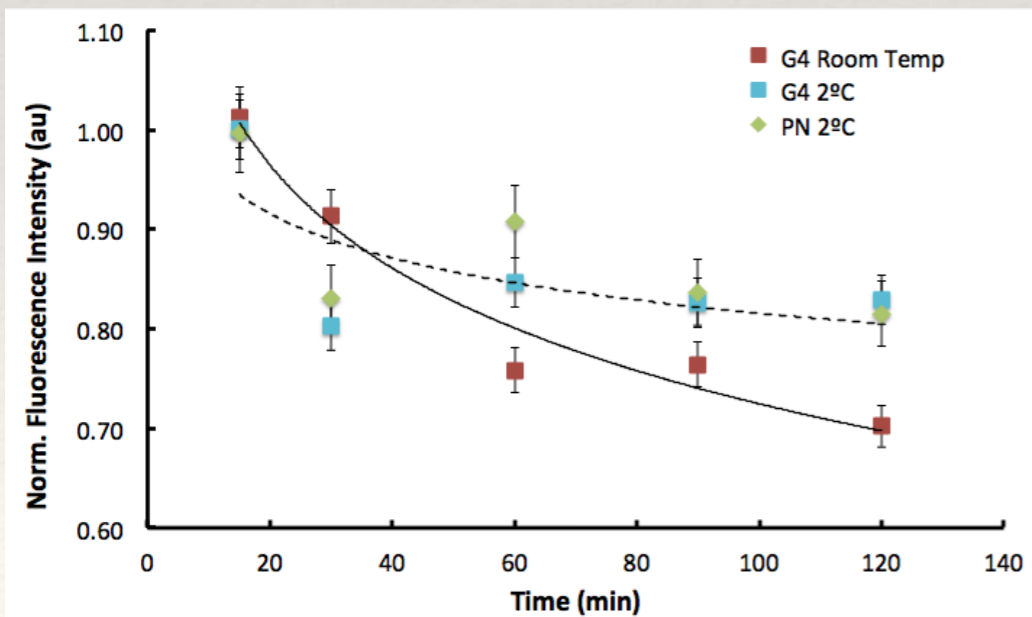
Ongoing Work: Minimizing Toxicity



Cell-Association Kinetics



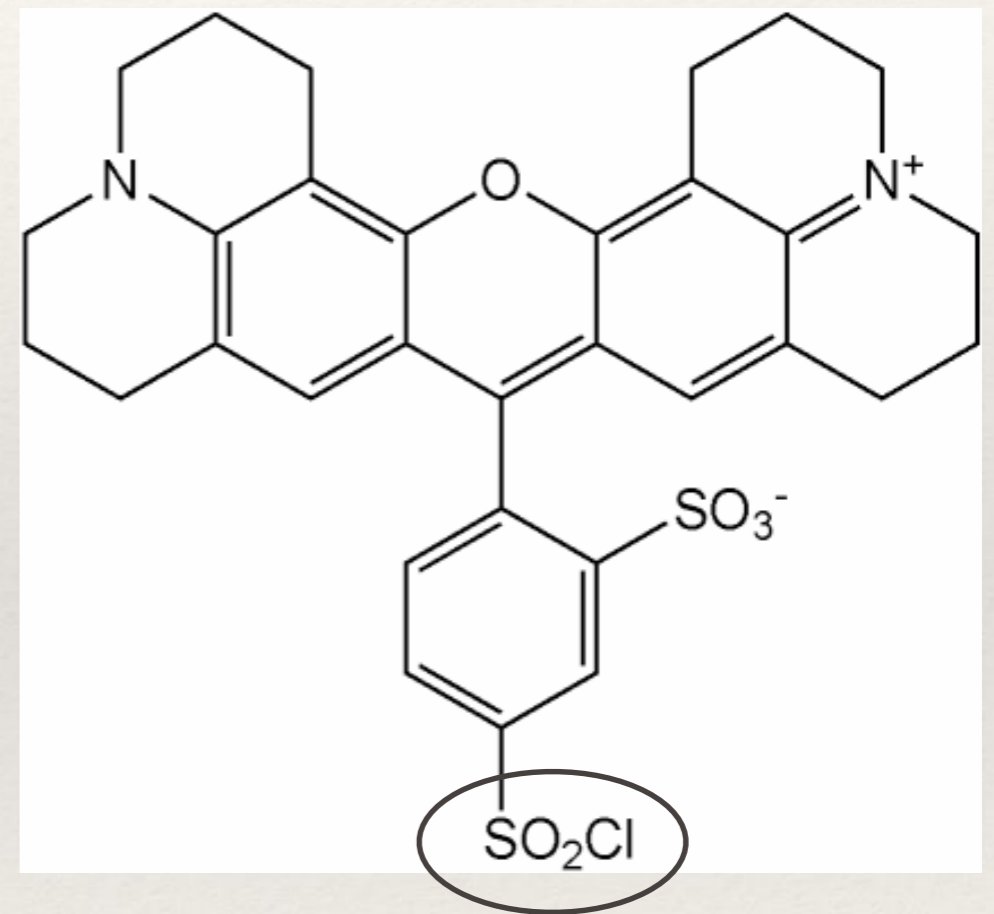
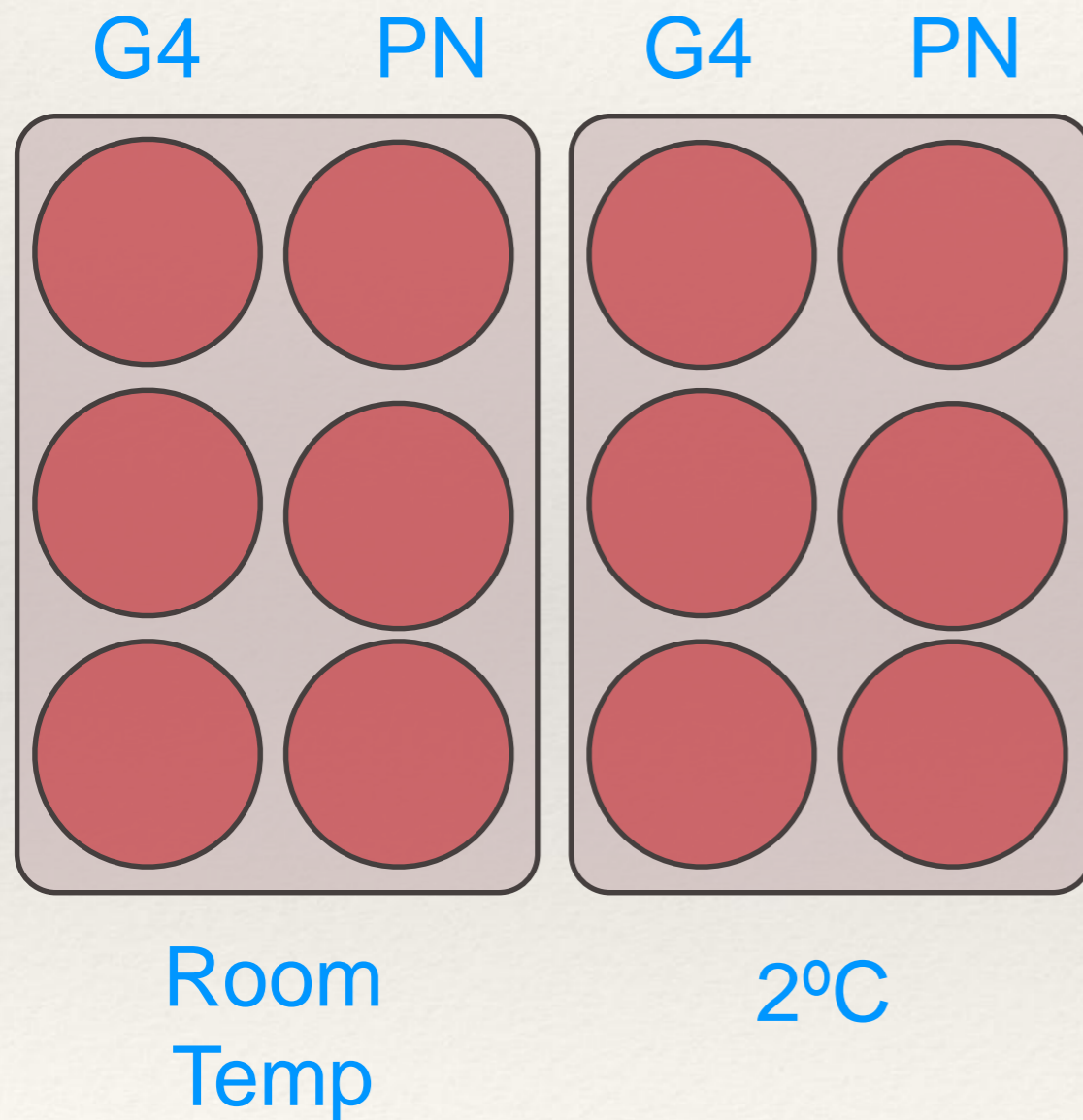
- ❖ Assume all uptake halted at 2°C
- ❖ Approximate exposed amoeba surface area as $2\pi r^2$
- ❖ Number of live cells in each well counted: 0.88 million cells/well



Dendrimer uptake: 20 million/cell/min
Dendrimer+PN Uptake: 1 million/cell/min

Adsorption spacing: 3-6 nm between dendrimers

Cell-Association Kinetics



588nm/601nm