

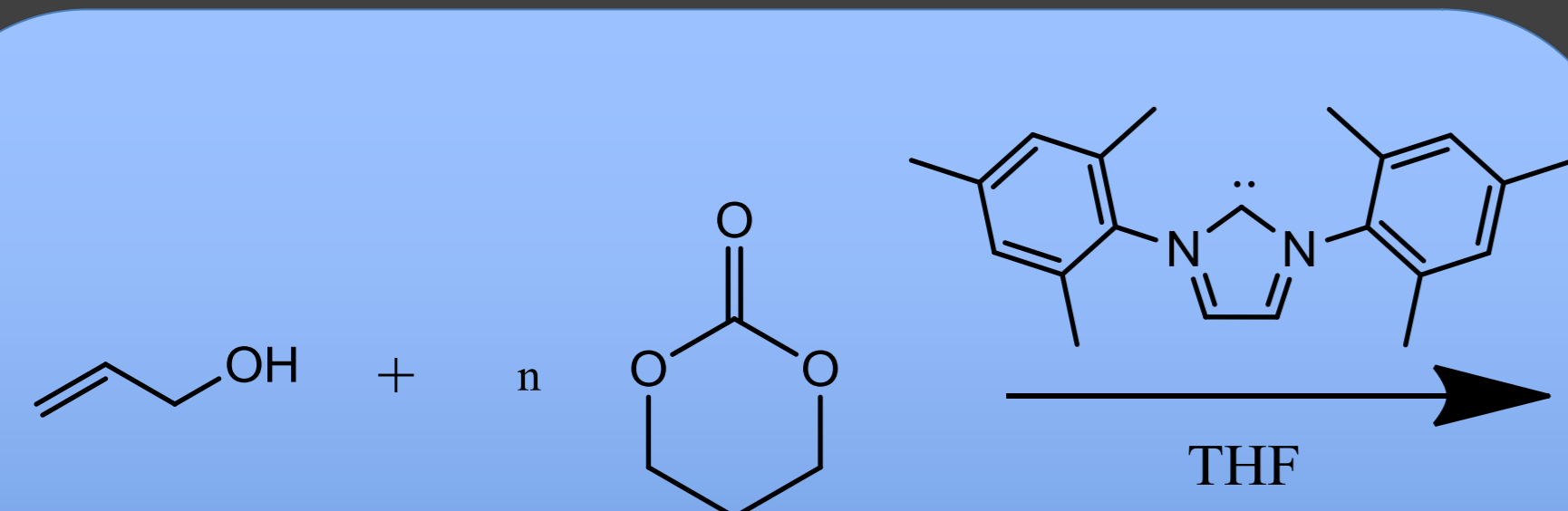
**INTRODUCTION – Drug delivery system**

- Current cancer therapies suffer from a lack of specificity
- Therapeutics damage both diseased and healthy cells
- Aim to exploit the unique enzymatic environment of tumour cells for a targeted and triggered delivery system
- Polymersomes based on PTMC-b-PGA copolymer

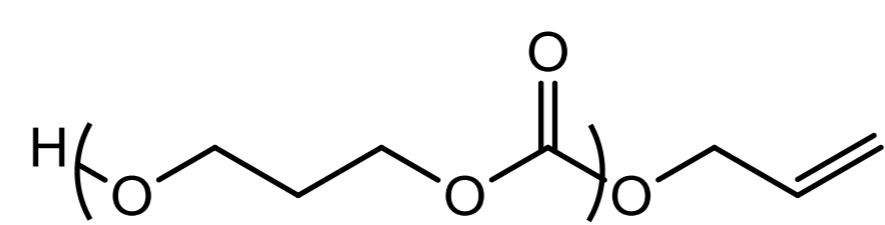
**Quantifying drug concentrations**

- Traditional methods of drug quantification suffer from a number of inaccuracies
- Drug-selective membranes can be synthesized and used for direct electro-chemical measurements of drug concentrations

**Model Chemistry**

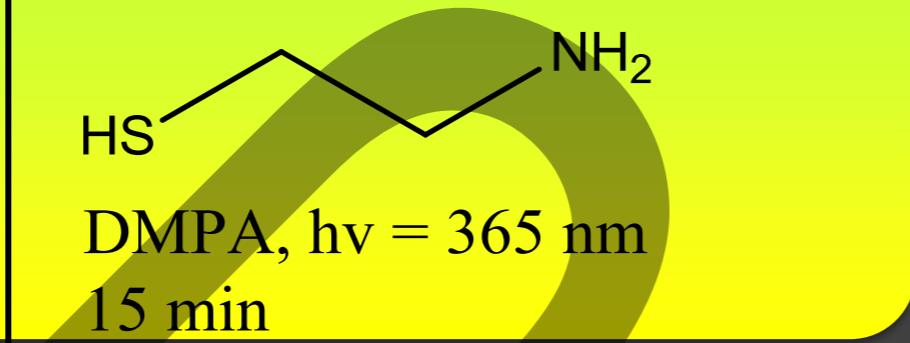


- Ring opening polymerisation
- Organic N-Heterocyclic carbene catalyst eliminates traditional meta I catalysts and metallic by products
- Good control, accurate targeting of DPs

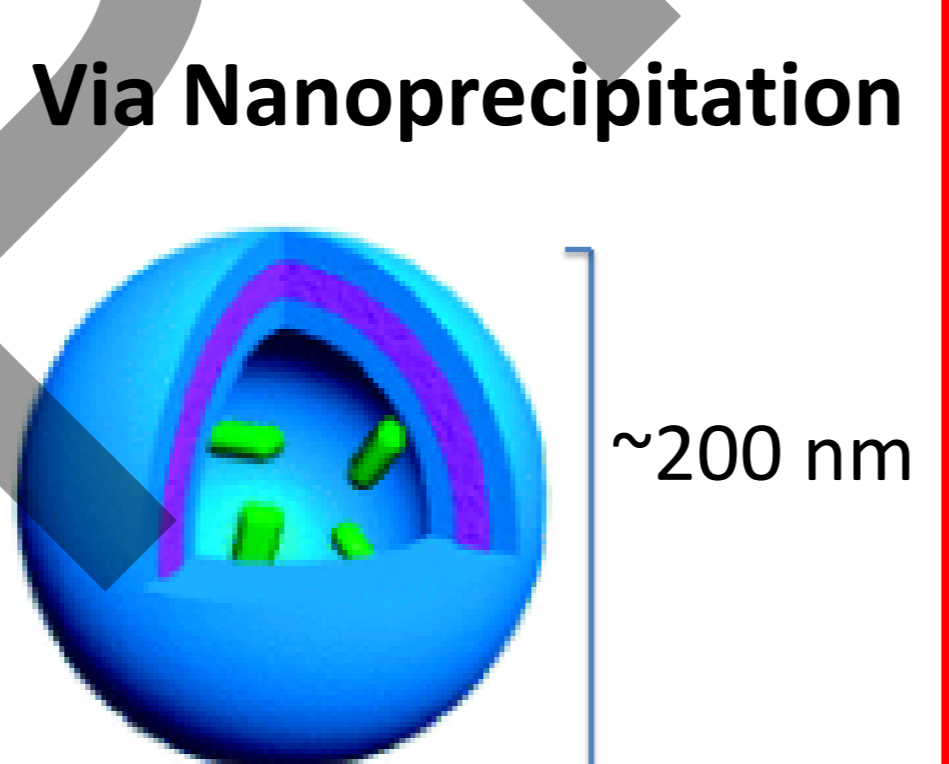
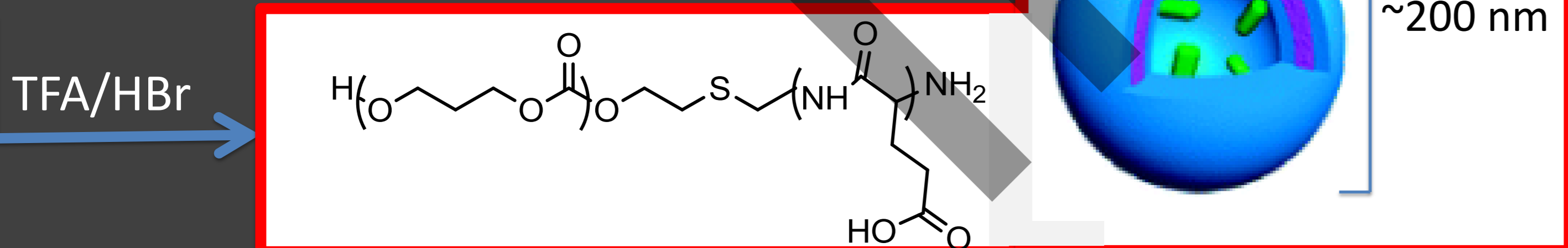


PTMC		
DP <sub>target</sub>	DP <sub>Expt</sub>	PDI
13	12	1.07
30	29	1.09
50	46	1.05

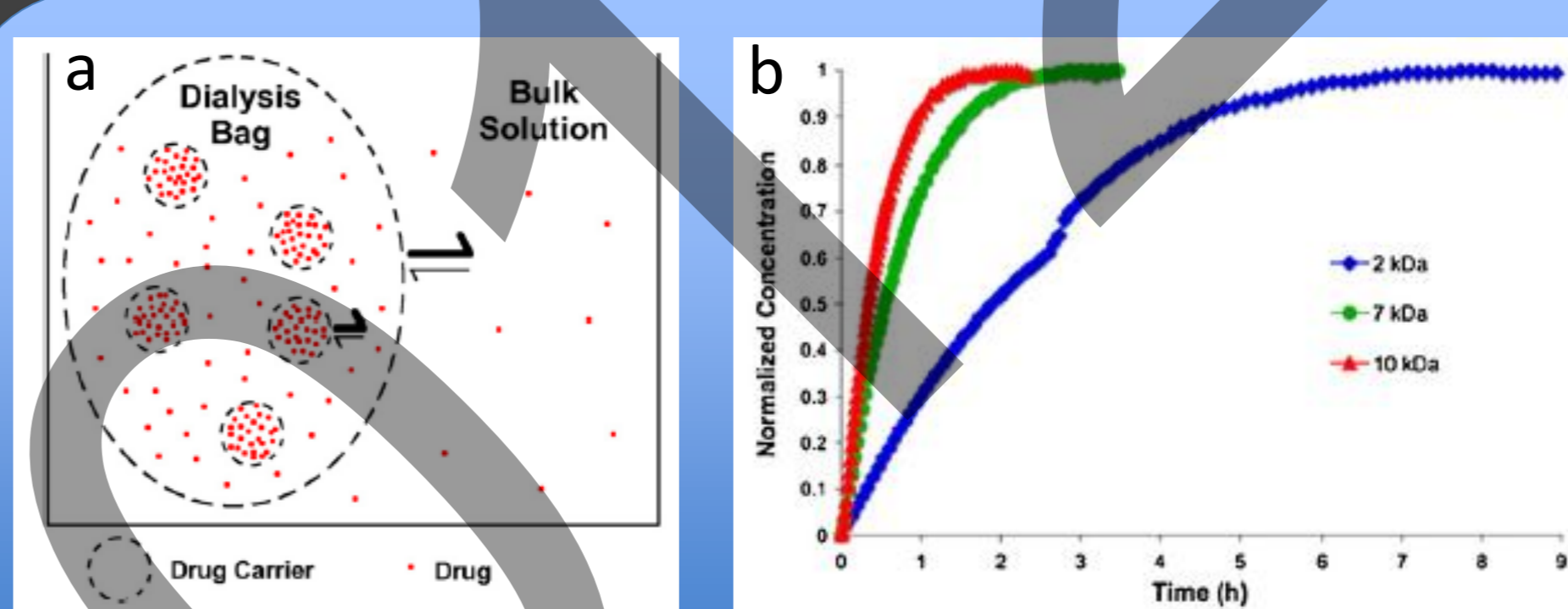
- Functionalisation of PTMC block via UV-initiated thiol-ene "click" chemistry
- Fast reaction time, ambient conditions



- Ring opening polymerisation utilizing a macromolecular initiator

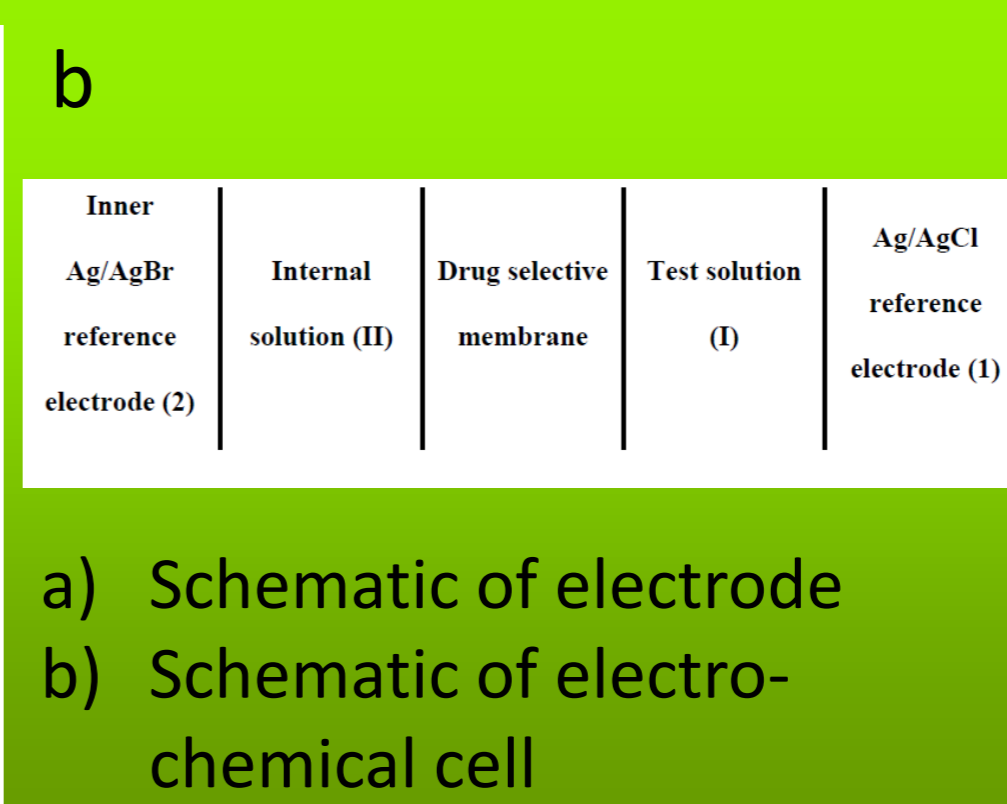
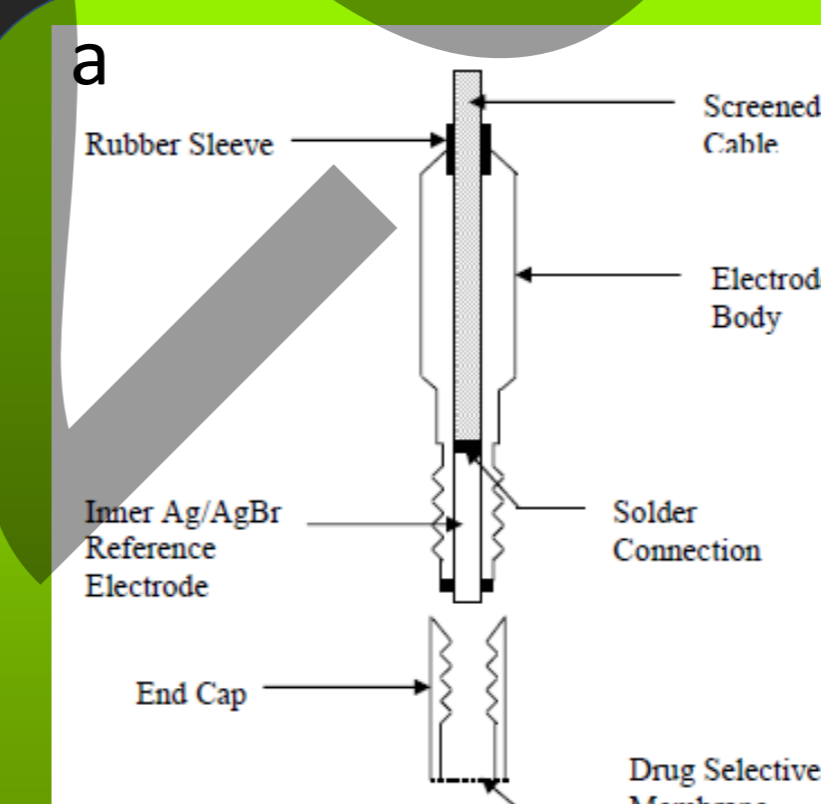


**Procaine Selective Electrode**



- Quantifying drug release by dialysis suffers from double-barrier effect and inaccuracies due to dialysis membrane interference

a) Schematic of double barrier effect. b) changes in drug release profiles due to changes in dialysis bag MWCO

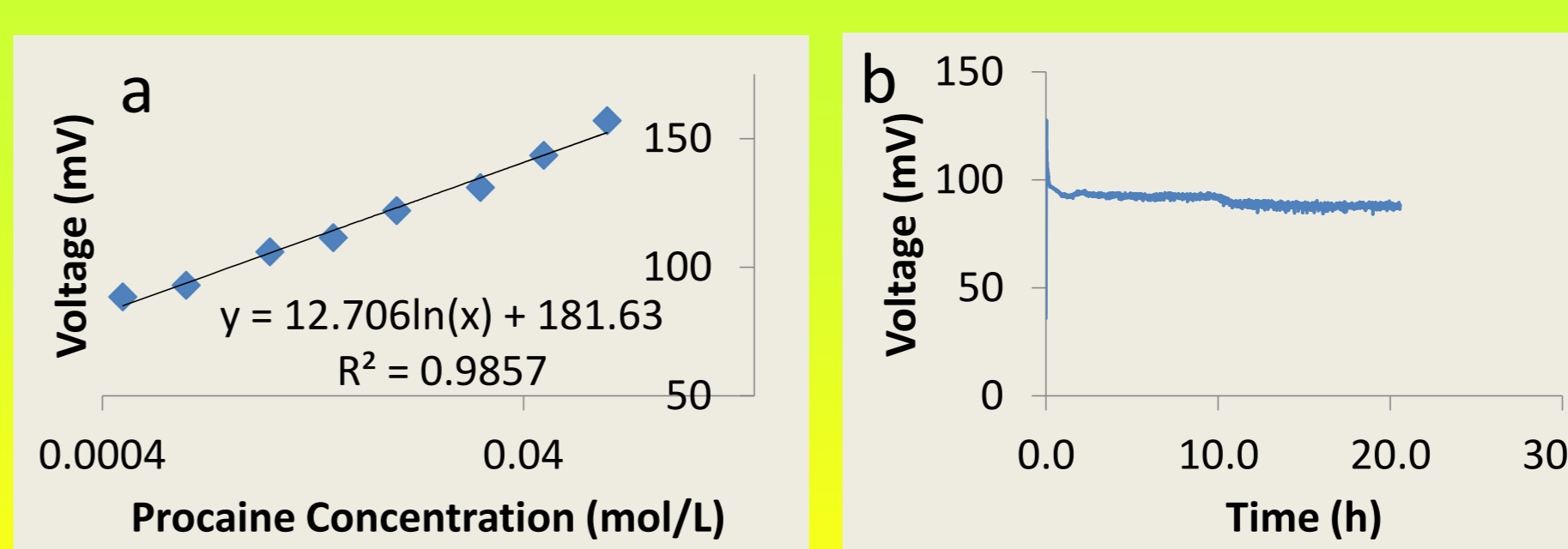


Procaine-Selective Membrane		
Drug/PVC	Plasticizer	NaTPS
50 %	49 %	1 %

- a) Schematic of electrode
- b) Schematic of electro-chemical cell

c) Procaine-selective membrane composition

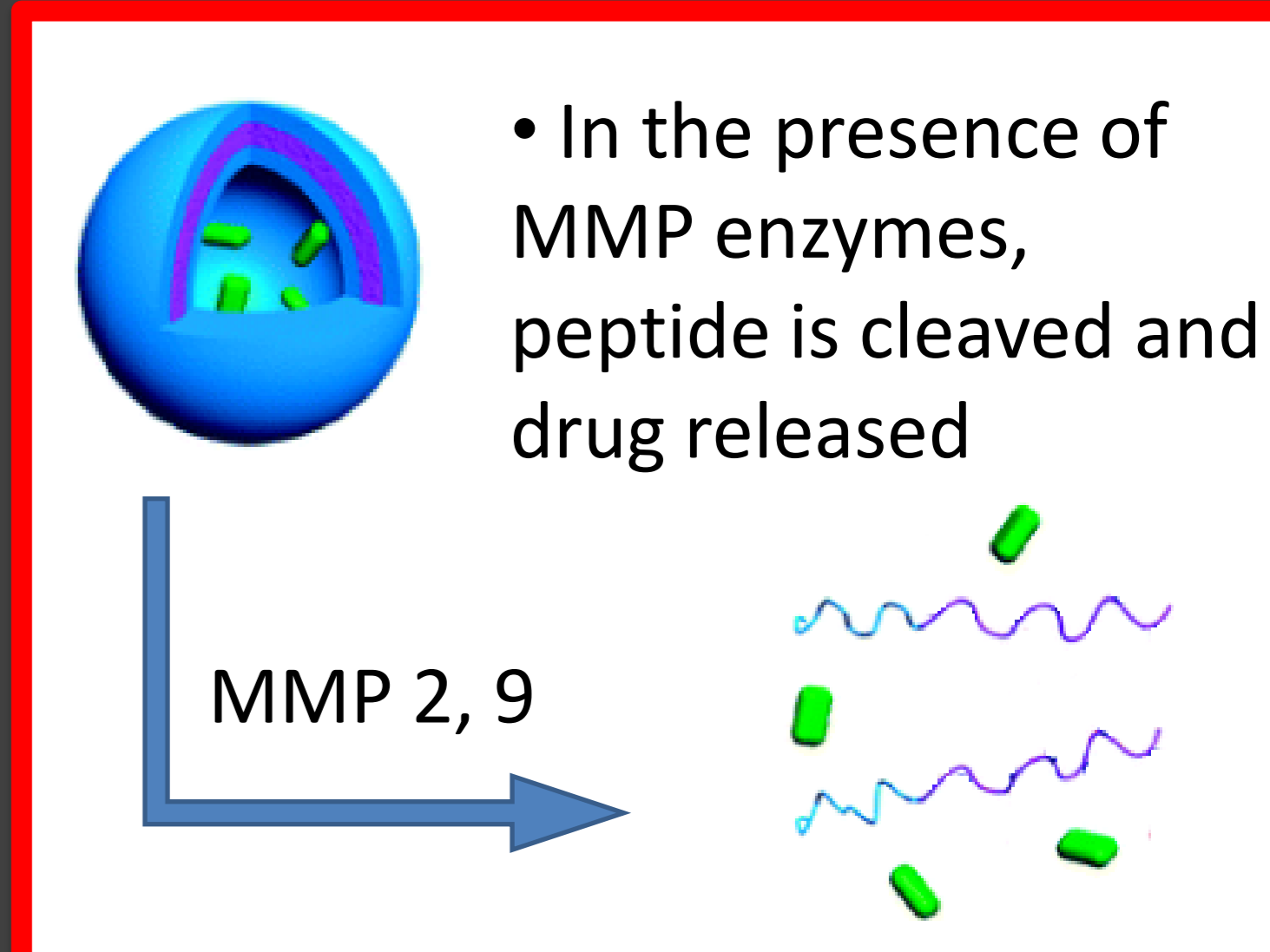
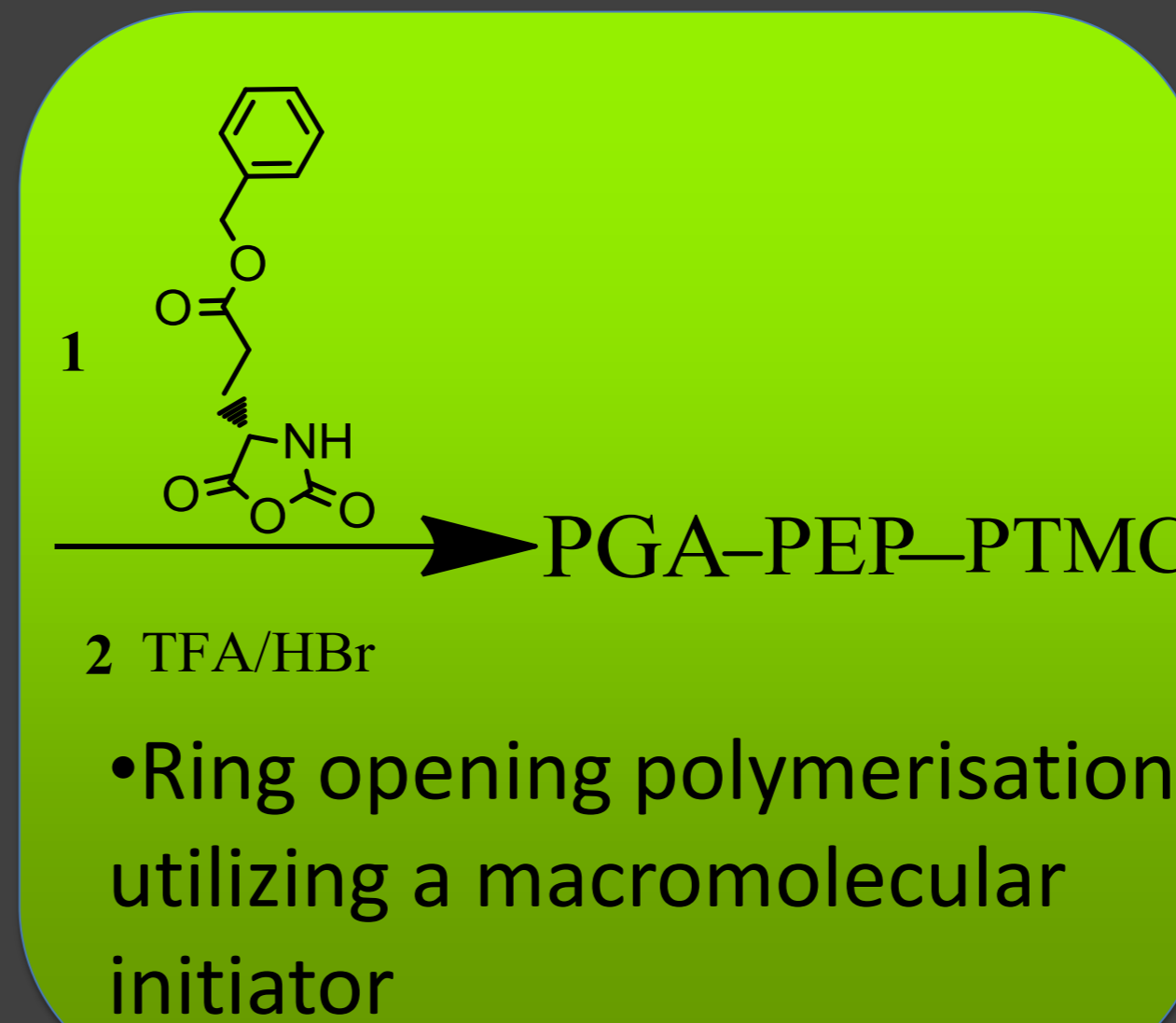
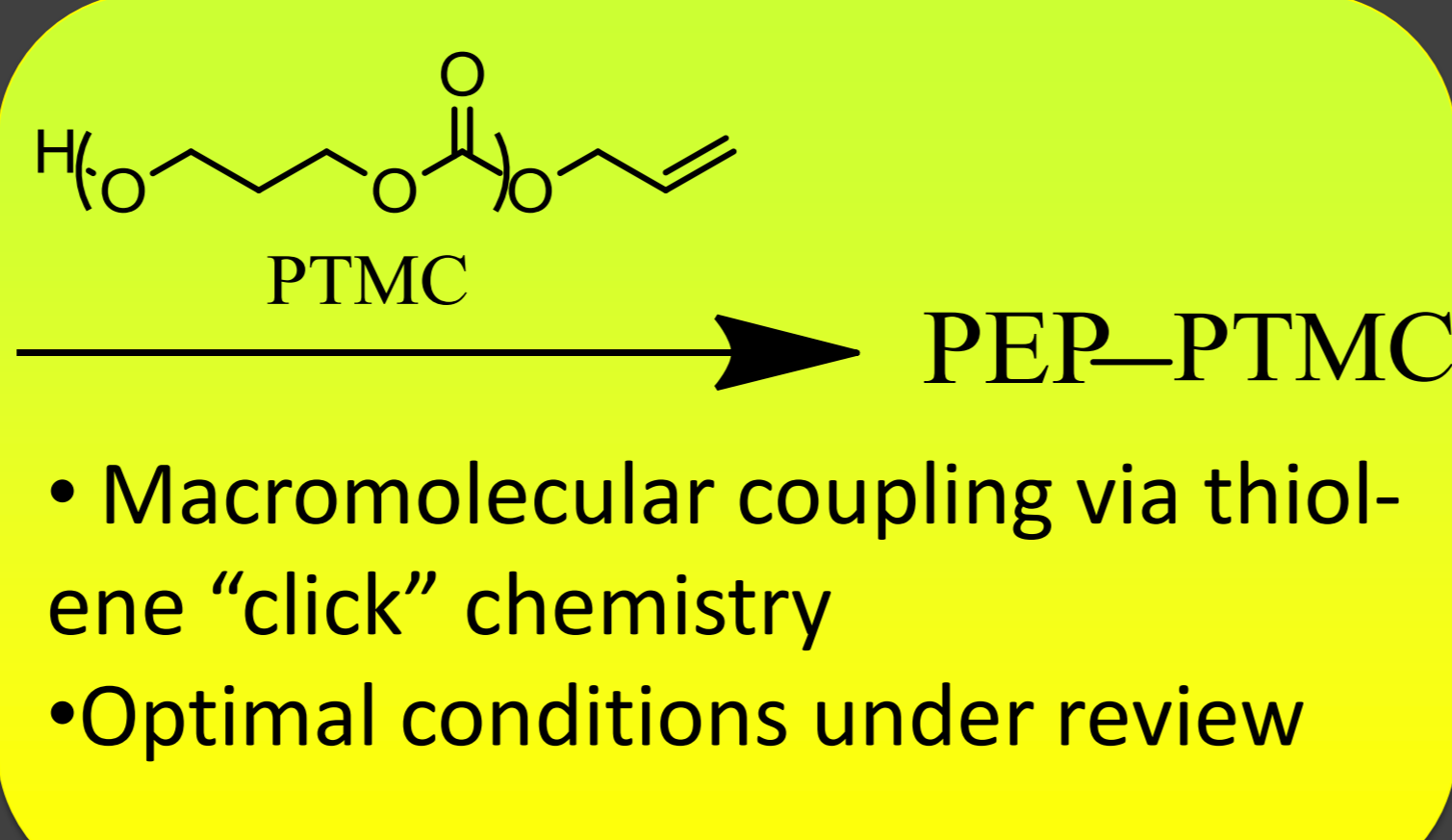
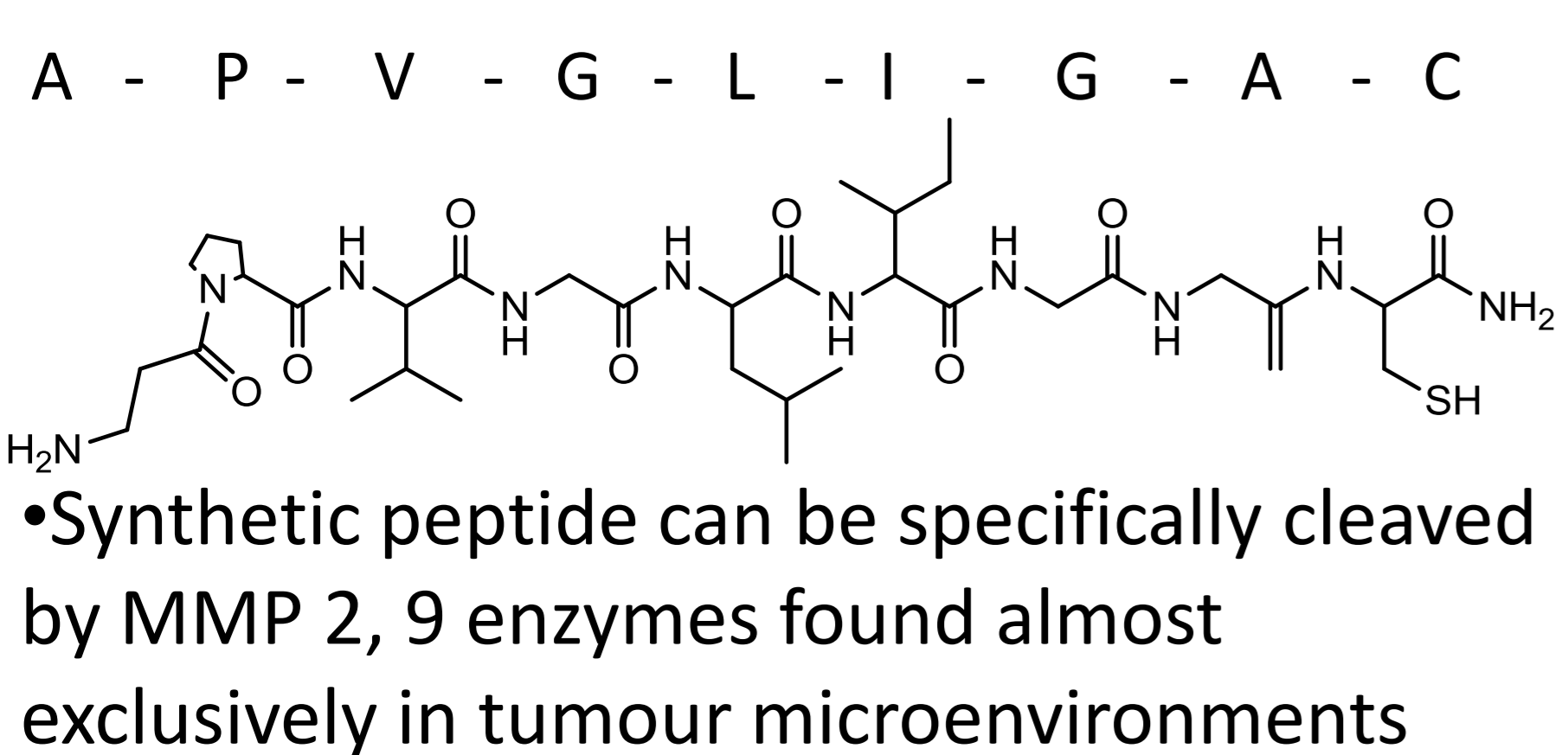
**Electrode Validation**



a) Electrode response over a range of concentrations. b) Electrode response over 24 h.

- Probe shows logarithmic response over a range of drug concentrations and drift of 0.3 mV/h over a 24 h period

**Enzyme-Responsive Trigger (In Progress)**



**Future Work**

- Assembly of polymersomes from PTMC-peptide-PGA system and loading of drugs
- Measurements of burst release in the presence of MMP-2,9

- Live monitoring of drug loading and release from polymersomes using drug-selective electrodes
- Development of electrodes responsive to various other drugs