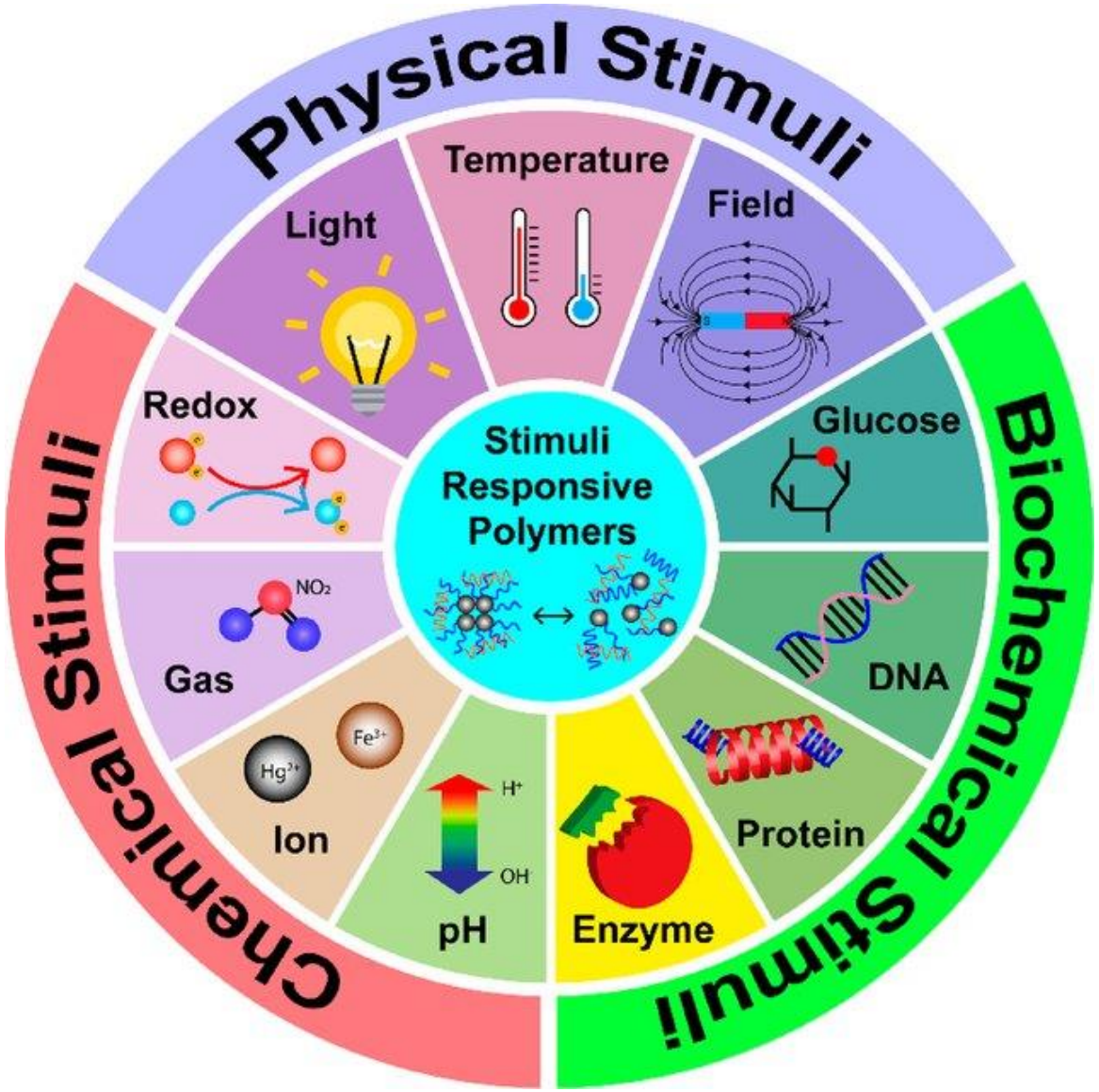
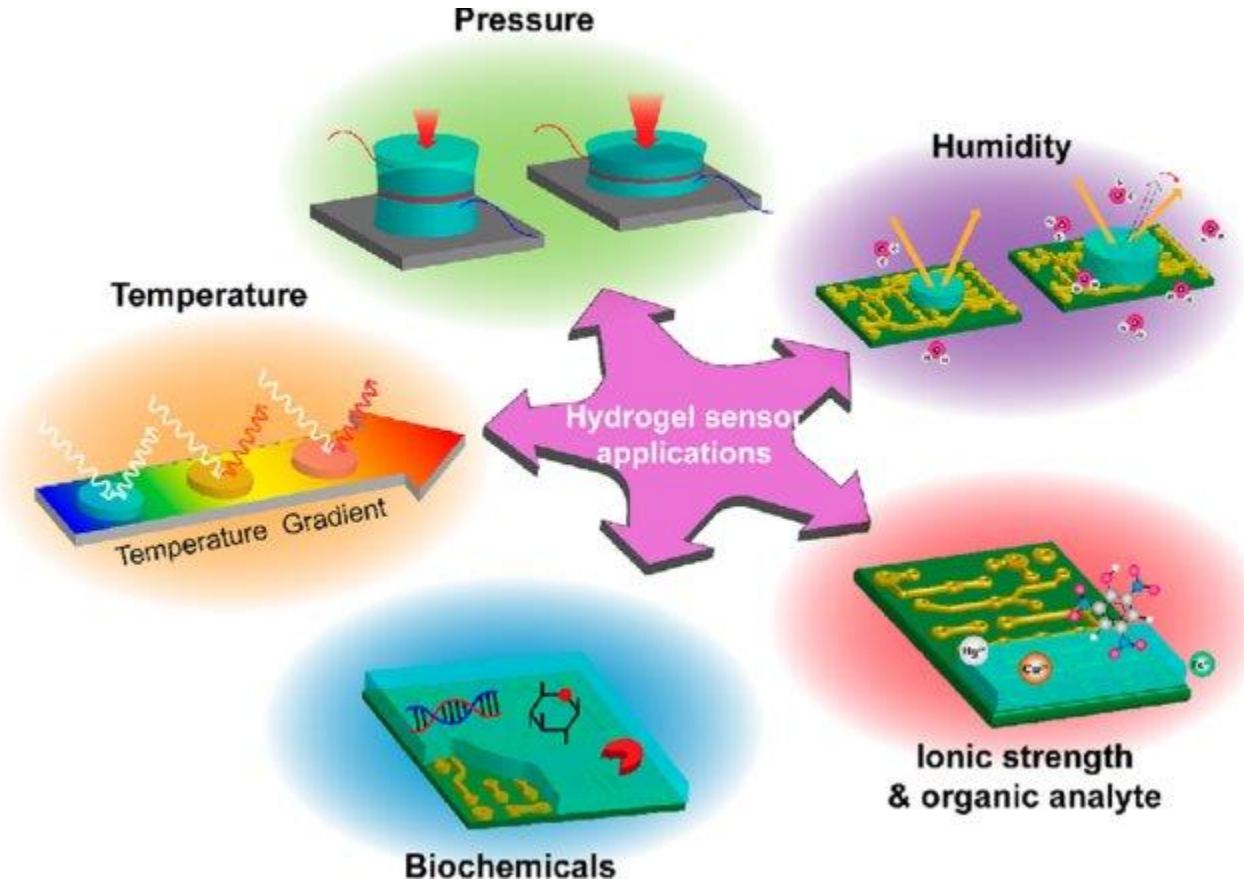
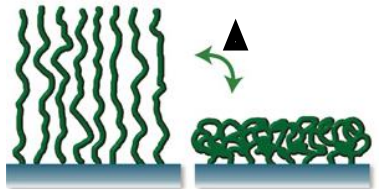
Stimuli Responsive Materials



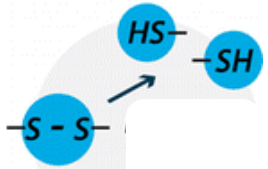


Ref: Sun et.al *ACS Appl. Bio Mater. 2021, 4, 1, 140–162*

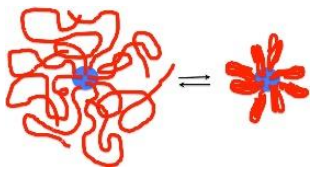
Polymer which undergoes physical, chemical or conformational changes in response to external stimuli



Physical

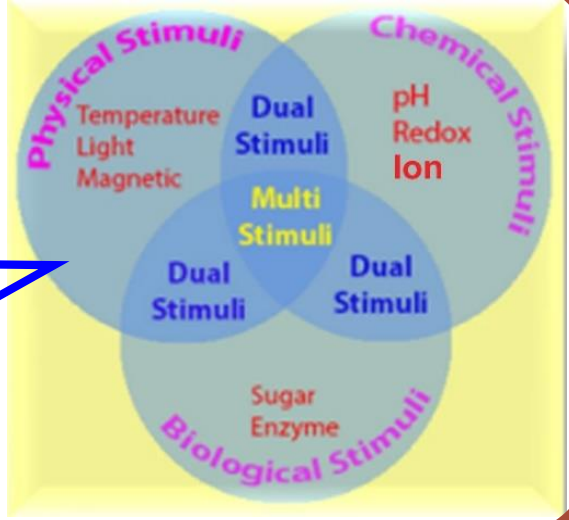


Chemical



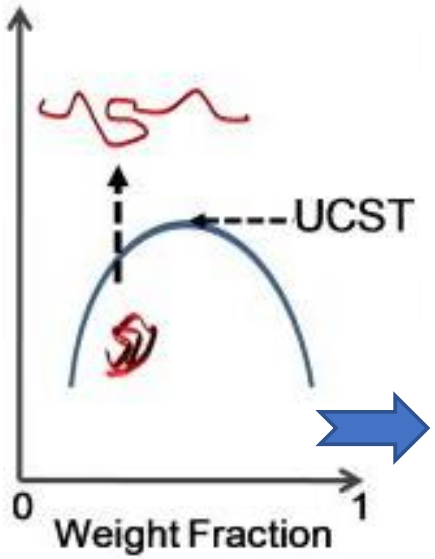
Conformational

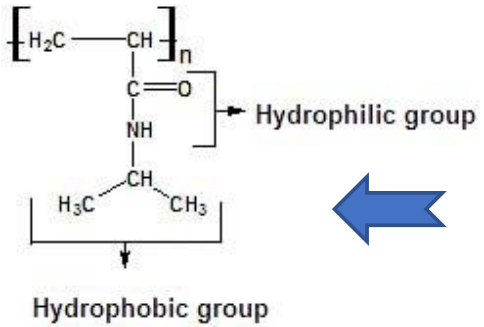
External Stimuli



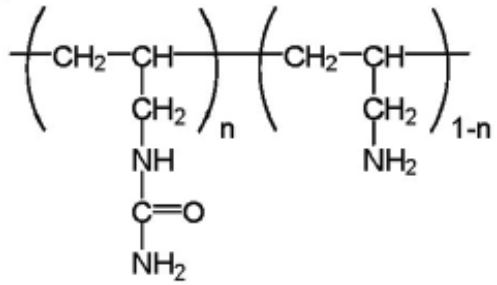
Thermo-responsive

UCST-Type



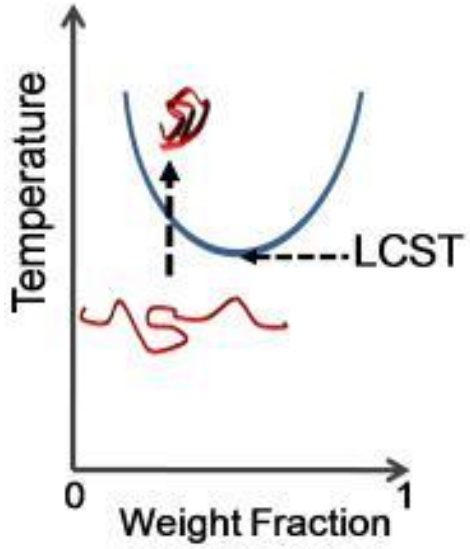


Poly(N-isopropyl acrylamide)

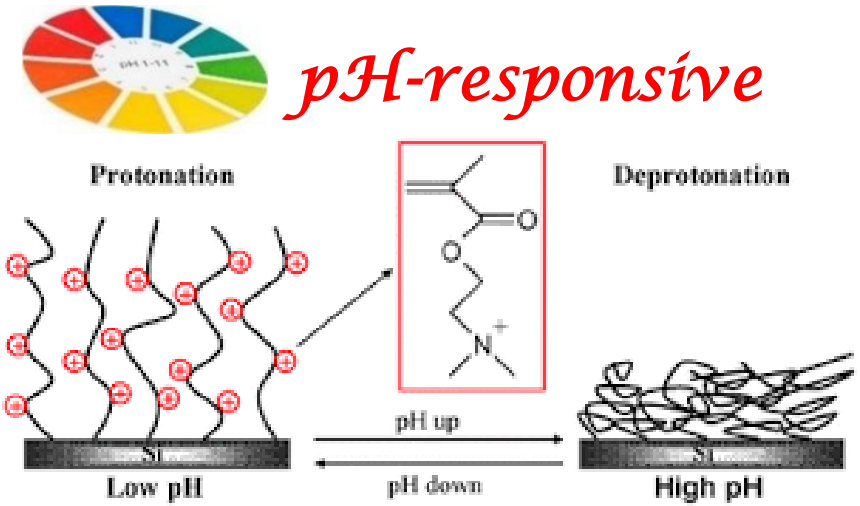


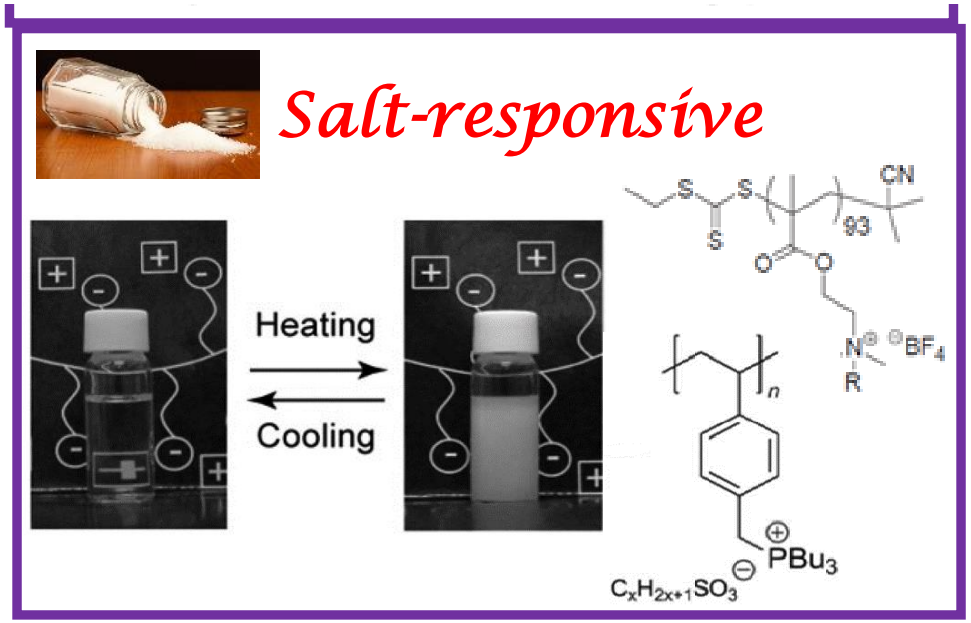
poly(allylamine)-*co*-poly(allylurea)

LCST-Type



Stimuli Responsive Materials...contd



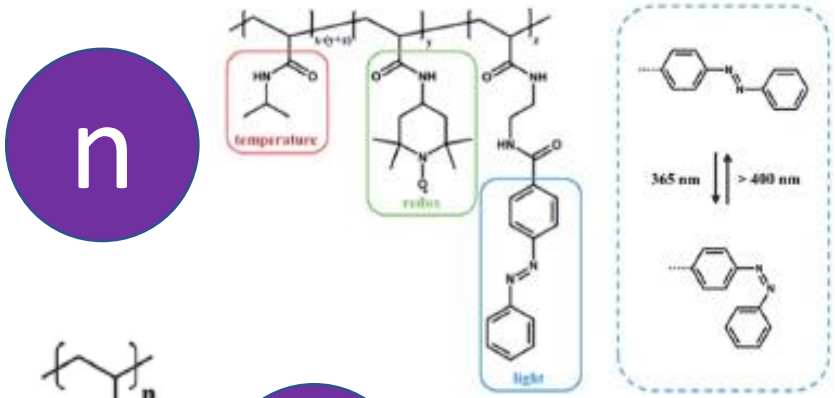


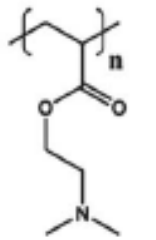
Types of Stimuli Responsive Materials

Multi Stimuli Responsive Materials

Double Stimuli Responsive Materials

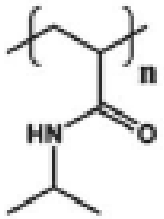
Single Stimuli Responsive Materials





2

PDMAEMA

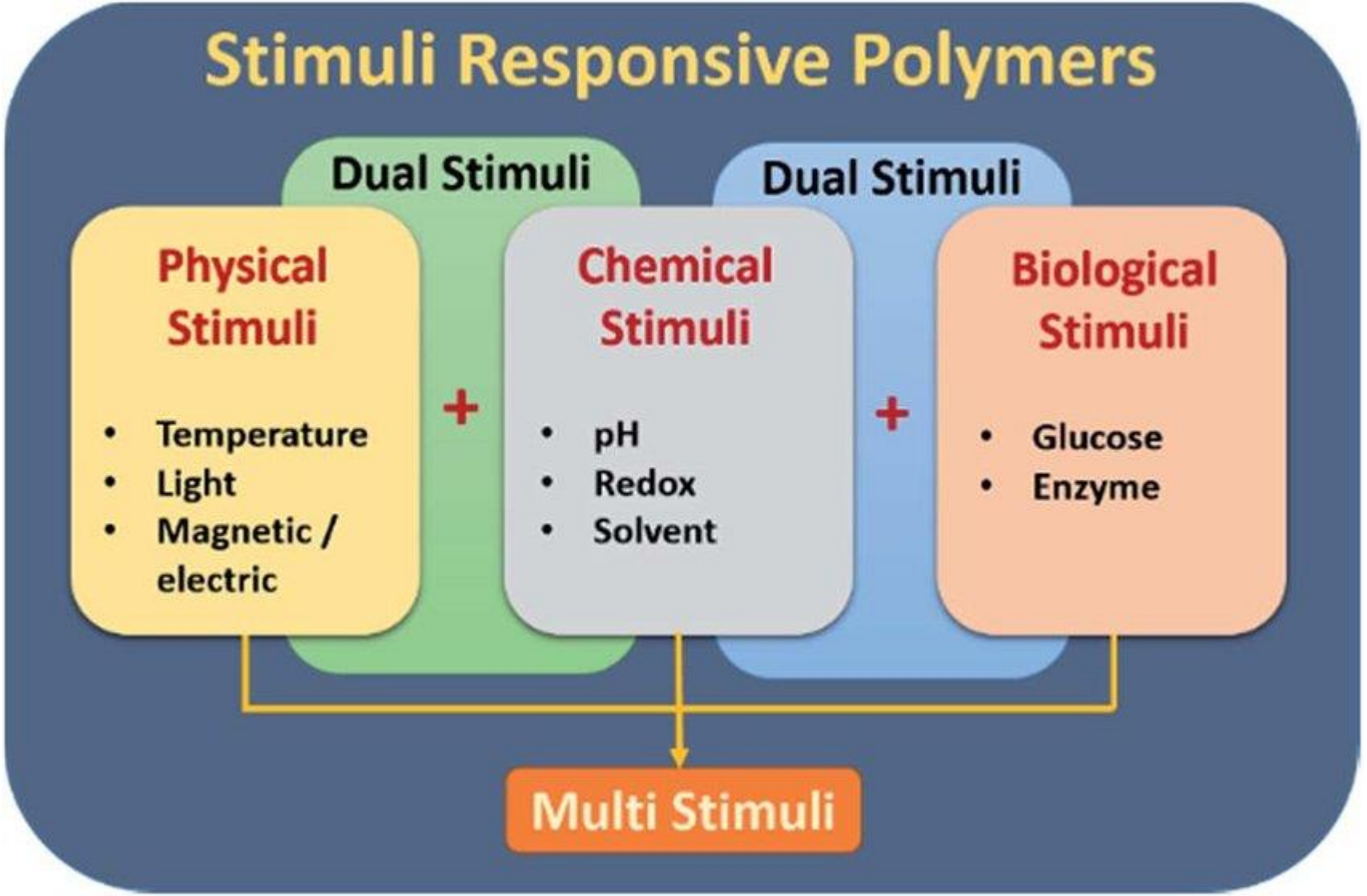


1

PNIPAM

Ref: Schattling et.al *Polym. Chem.*, **2014**, *5*, 25–36

Stimuli Responsive Polymers



Ref: RSC Adv., 2014,4, 53352-53364

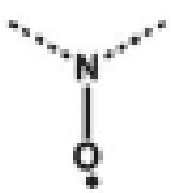
Single Stimuli Responsive Polymers

- Temp. Responsive Polymer
- Light Responsive Polymer
- pH Responsive Polymer
- Redox Responsive Polymer
- Temp. Responsive Polymer

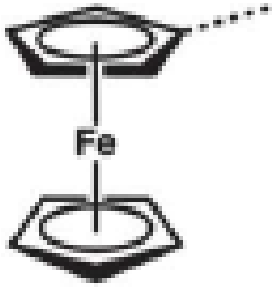
Ref: Schattling et.al *Polym. Chem.*, **2014**, *5*, 25–36

Single Stimuli Responsive Polymers…contd

Redox-activity



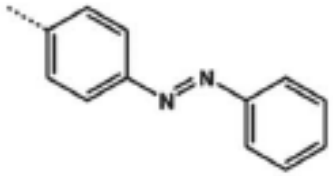
nitroxide



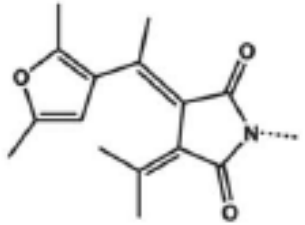
ferrocene

disulfide

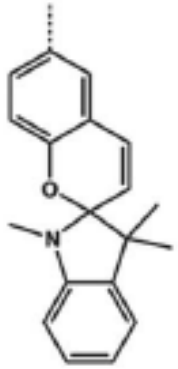
Light



azobenzene

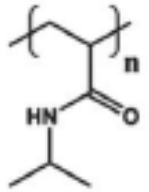


fulgide

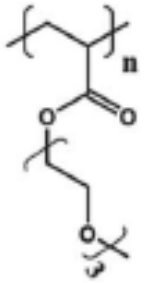


spiropyrane

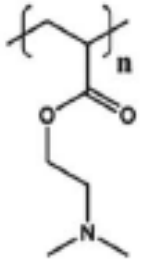
Temperature



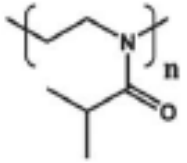
PNIPAM



PTEGMA

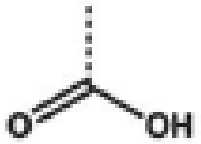


PDMAEMA

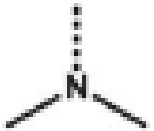


PIPOZ

pH

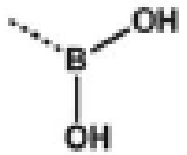


carboxylic acid

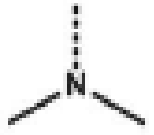


tert. amines

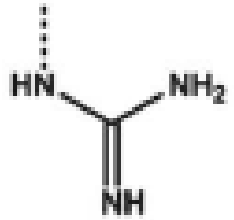
Chemo-responsive



boronic acid



tert. amines

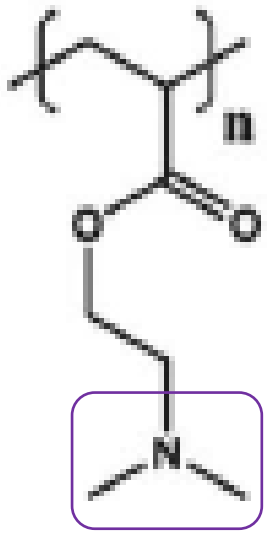


amidine

Ref: Schattling et.al *Polym. Chem.*, **2014**, *5*, 25–36

Double stimuli responsive polymers

1. Thermo and pH-responsive polymers



PDMAEMA

These materials attracted great attention in the field of drug delivery

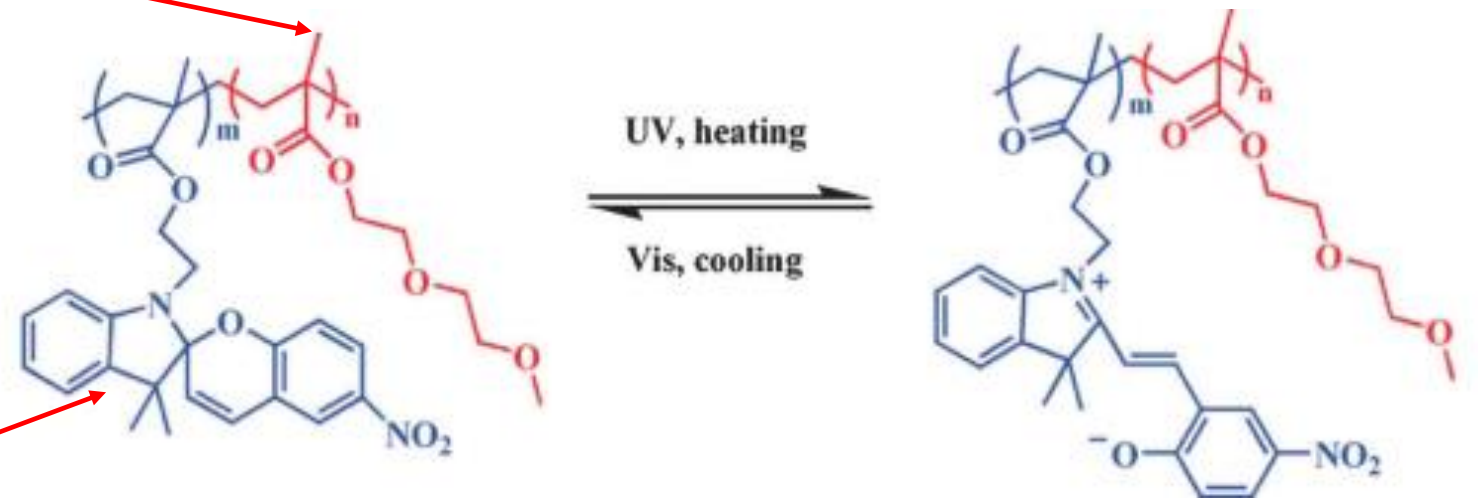
Ref: Schattling et.al *Polym. Chem.*, **2014**, *5*, 25–36

Double Stimuli Responsive Polymers

2. Thermo- and light-responsive polymers

Examples :- Spiropyran containing methacrylate (SPMA) with di (ethylene glycol) methyl ether methacrylate (PDEGMMA)

Thermo-responsive



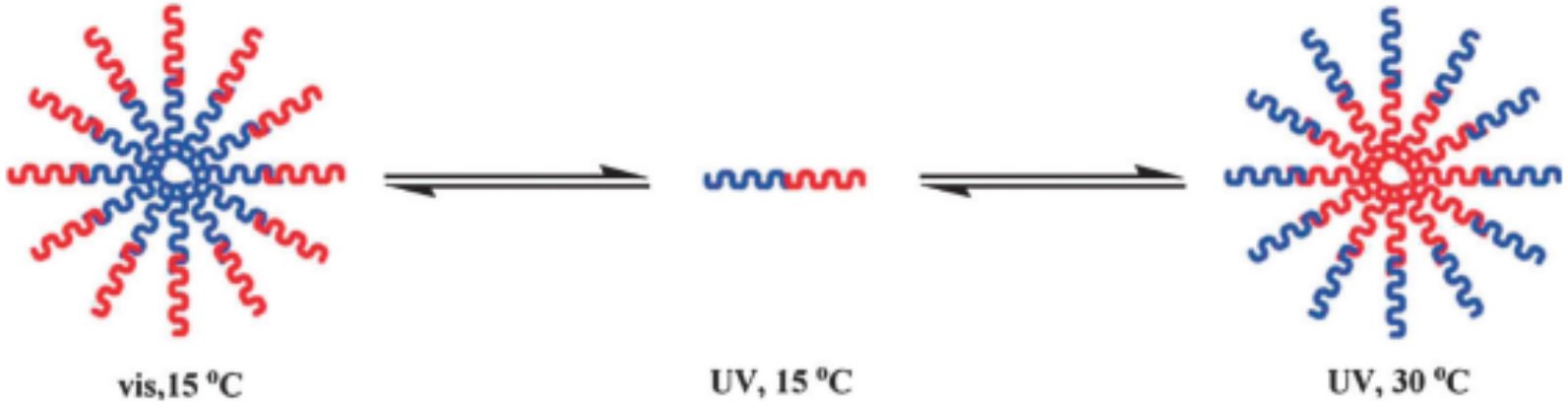
Light-responsive

Non polar, Hydrophobic & Colourless Polar, Hydrophilic & Colored

PSPMA-PDEGMMA

Ref: Jochum et.al *Chem. Soc. Rev.*, **2013**, *42*, 7468--7483

Double Stimuli Responsive Polymers



PSPMA-PDEGMMA

Micelles formed by changing the temperature (from 15°C to 30°C) of the solution and by photo irradiation. These micelles were used for encapsulation and controlled release and re-encapsulation of the model drug.