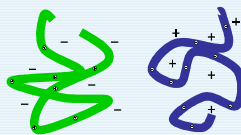
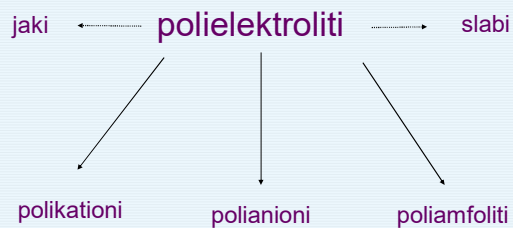


Polielektroliti u otopini, kompleksiranje polielektrolita

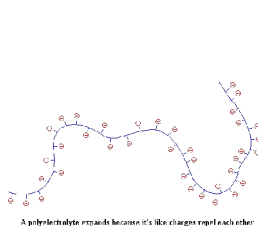
Prema definiciji IUPAC-a **polielektroliti** su **makromolekule** kod koje je prisutan znatan udjel konstitucijskih (gradivnih) jedinica koje sadrže ionske i/ili lako ionizirajuće skupine.



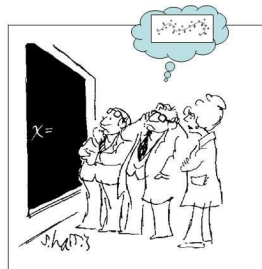
suprotno nabijeni polielektroliti u otopini



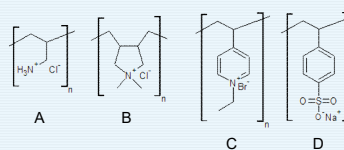
Polyelectrolyte solutions



A polyelectrolyte expands because it's like charges repel each other

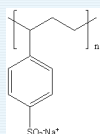


Polielektroliti



- A - poli(alilamonijev hidroklorid), PAHCl
- B - poli(dialildimetilamonijev klorid), PDADMAC
- C - poli(N-etil-4-vinilpiridinijev bromid), P4VPBr
- D - poli(natrijev stirensulfonat), NaPSS

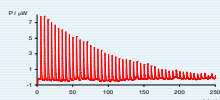
Otopine polielektrolita



poli(natrijev stirensulfonat), Na⁺PSS⁻

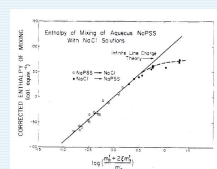


izotermalna titracijska mikroklorimetrija (ITC)

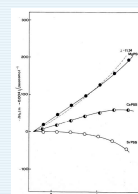


mikroklorimetrijska titracija vodene otopine Na⁺PSS⁻ vodenom otopinom CsNO₃

izotermalna titracijska mikroklorimetrija

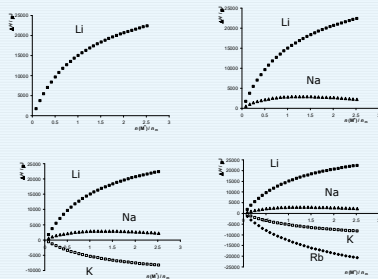


G. E. Boyd, D. P. Wilson, G. S. Manning, J. Phys. Chem. 80 (1976) 808

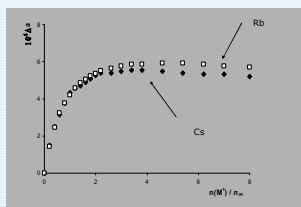
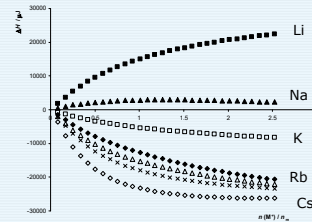


G. Vesnaver, Z. Kranjc, C. Pohar, J. Škerjanc, J. Phys. Chem. 91 (1987) 3845

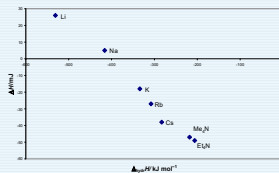
mikrokolorimetrijska titracija vodene otopine Na^+PSS^- vodenim otopinama različitih soli



mikrokolorimetrijska titracija vodene otopine Na^+PSS^- vodenim otopinama različitih soli

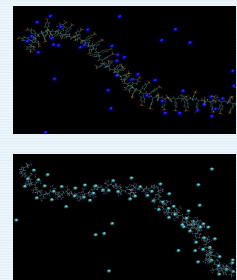


potenciometrijska titracija primjenom natrij ion-selektivne elektrode



računalne metode

suprotno nabijeni polielektroliti u otopini

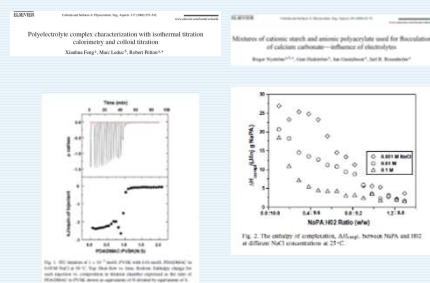


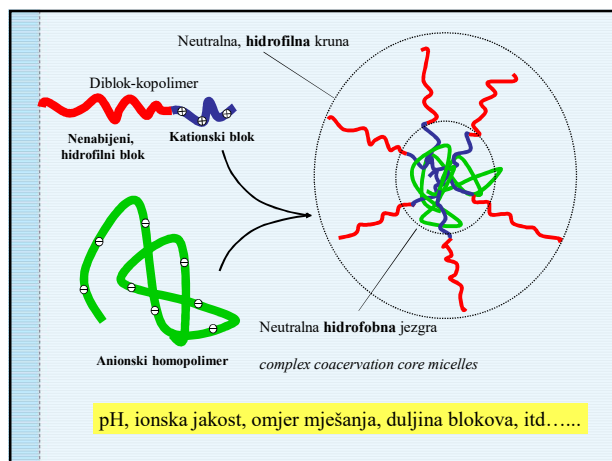
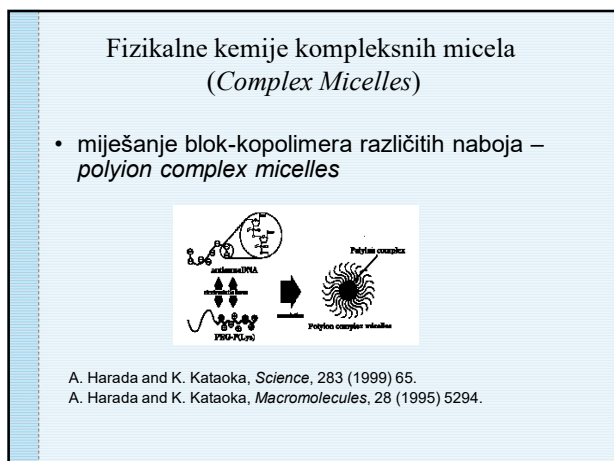
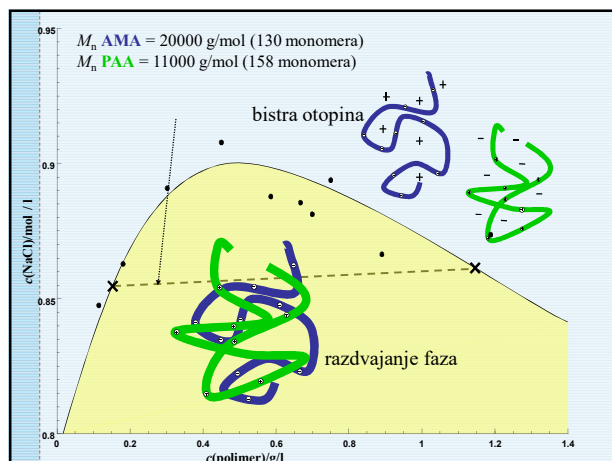
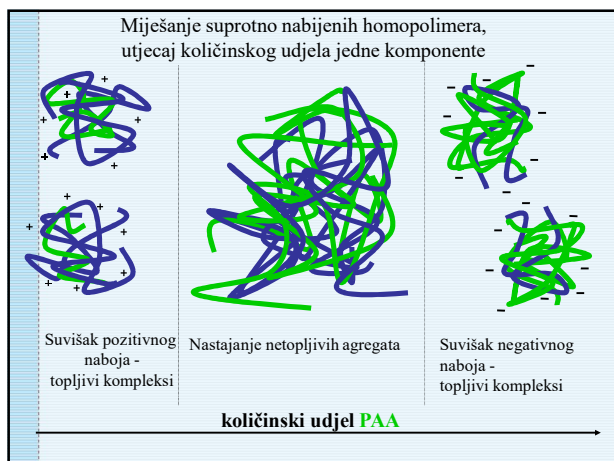
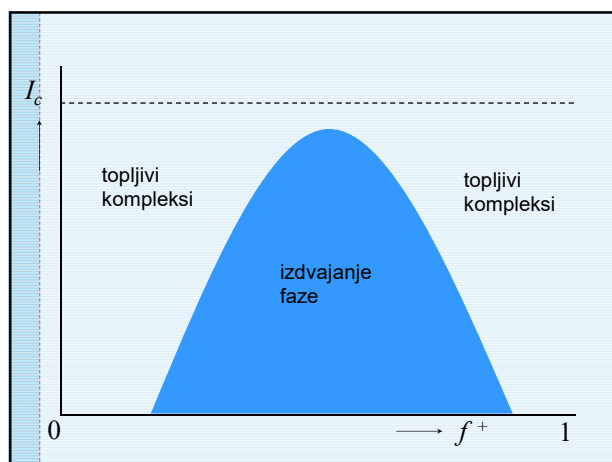
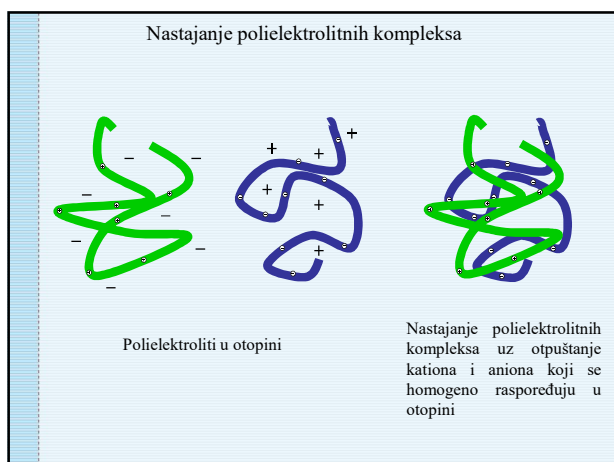
kompleksiranje polielektrolita (polikationa i polianiona) u otopini

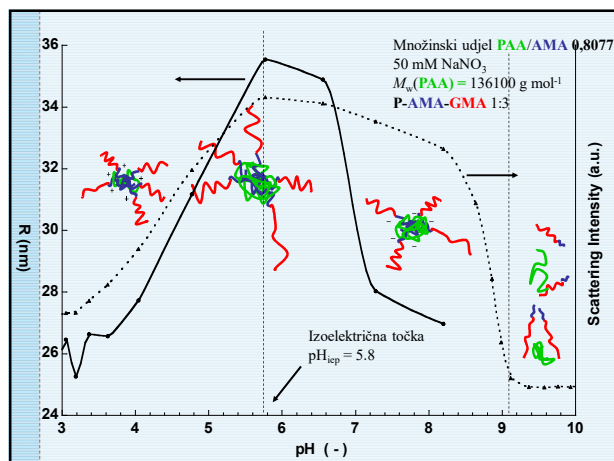
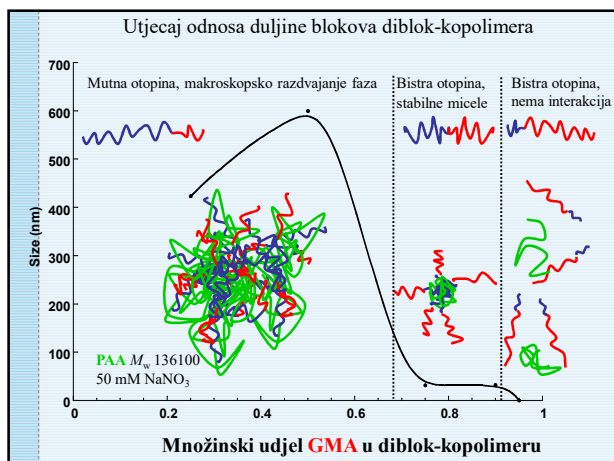
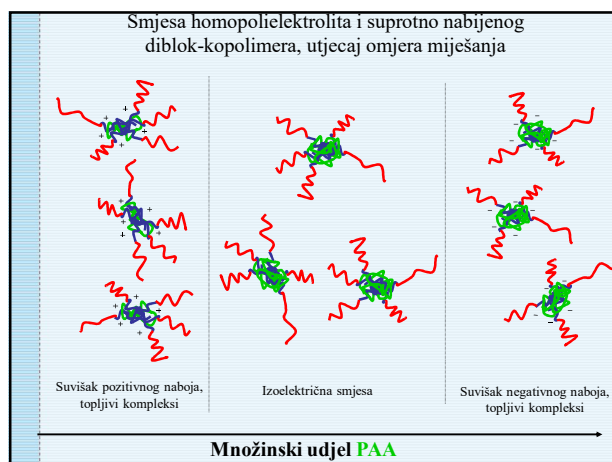
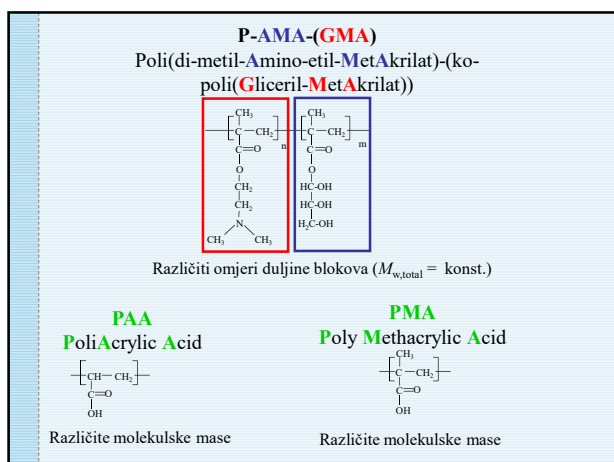
- elektrostatske interakcije
- polielektrolitni kompleksi (*polyelectrolyte complexes*)

topljivi kompleksi
izdvajanje faze (*phase separation*)

istraživali Voorn, Bungeberg de Jong i Michaels
u *Colloid Science*, H. R. Kruyt, Ed. (Elsevier Publishing Company, Amsterdam, 1949) vol. II, pp. 335-384







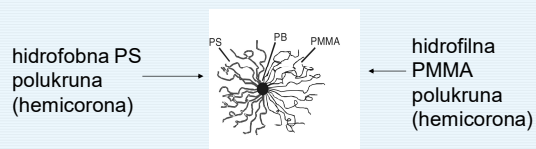
Janusove micelle

miješanje blok-kopolimera različitih naboja –
polyion complex micelles

amfifilni diblok (triblok) kopolimeri tvore
 Janusove micelle



Janusove micle



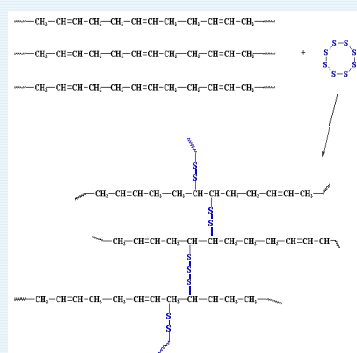
R. Erhardt et al, *Macromolecules*, 34 (2001) 1069.
R. Erhardt et al, *J. Am. Chem. Soc.*, 125 (2003) 3260.

Janusove micle

prekursor:
polistiren-*blok*-polibutadien-*blok*-poli(metil metakrilat)
(SBM) triblok kopolimer sintetiziran sekvencijalnom anionskom polimerizacijom

cross-linking (umrežavanje) metoda - reaktant S_2Cl_2

Umrežavanje (cross-linking)



Janusove micle

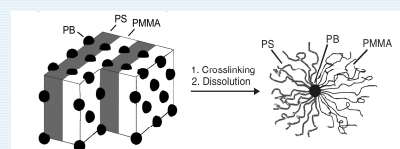


Figure 1. Schematic representation of the Janus micelles' synthesis (left hand side: sketch of SBM ls-morphology).

Janusove micle

karakterizacija:

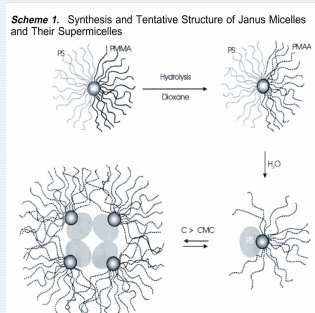
- *Transmission Electron Microscopy* (TEM)
- *Multi-Angle Laser Light Scattering Gel Permeation Chromatography* (MALLS-GPC)
- *Confocal Fluorescence Correlation Spectroscopy* (FCS)

- na svaku PB jezgru vezano 13 ± 5 lanaca
- radijus procijenjen na $11,4 \pm 0,8$ nm

Janusove micle

- u otopini tvore superstrukture orijentirane prema površini
- priprava raznih supramolekularnih objekata
- iznad kritične agregacijske koncentracije ($0,03$ g/L) nastaju u vodenj otopini (uz NaCl) sferne superstrukture ("supermicle") od oko 30 PS-PMMA micela radijusa 40-60 nm.

nastajanje "supermicela"

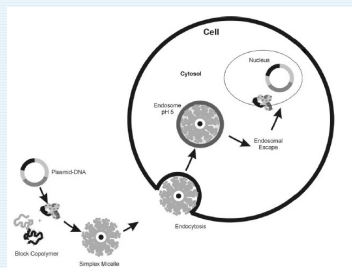


"Janus beads" (Janusove kuglice)

- parcijalna hidrofobna modifikacija staklenih sfernih čestica

C. Casagrande and M. Veyssié, *C. R. Acad. Sci (Paris) II* 306 (1988) 1423.

Block copolymer micelles for gene therapy



Transfection of plasmid DNA using diblock copolymer. DNA is released inside the cytosol and appears in the nucleus to express a desired protein.

Forster and M. Konrad, *From self-organizing polymers to nano- and biomaterials*, J. Mater. Chem., 13 (2003) 2671-2688.

primjena

- nosači lijekova (*drug carriers*)
- ugradnja hidrofobnih anti-tumorskih lijekova u jezgru i njihova "dostava" do tumora

- | | |
|---|--|
| <p>19. 5.</p> <ol style="list-style-type: none"> 1 Radikalna polimerizacija s primjerima 2 Ionska polimerizacija s primjerima 3 Koordinacijska polimerizacija s primjerima 4 Stupnjevit polimerizacija s primjerima 5 Kinetika reakcija polimerizacije 6 Raspršenje rendgenskih zraka pri malim kutovima (SAXS) 7 Raspršenje neutrona pri malim kutovima (SANS) 8 Sedimentacijsko određivanje molarne mase 9 Metode mjerenja viskoznosti otopina makromolekula 10 Određivanje prosjeka molarne mase mjerenjem osmotskog tlaka <p>26. 5.</p> <ol style="list-style-type: none"> 11 Flory-ey model rešetke 12 Polimeri kao stabilizatori nanočestica 13 Određivanje bakterija u zvakadim gumama 14 Antibakterijski tekstil 1 15 Antibakterijski tekstil 2 16 Blok-kopolimeri 17 Triblok-kopolimeri 18 Cirkularni dikrozam 19 Dendrimeri 20 Primjena dendrimera u medicini | <p>2. 6.</p> <ol style="list-style-type: none"> 21 Metode karakterizacije polielektrolitnih višestojeva 22 Primjena polielektrolitnih višestojeva u biomedicini 1 23 Primjena polielektrolitnih višestojeva u biomedicini 2 24 Primjena polielektrolitnih višestojeva u biomedicini 3 25 Računala simulacija rasta polielektrolitnih višestojeva 26 Karakterizacija polisaharida kitozana 27 Samozacjeljujući polielektrolitni filmovi 28 pH-senzitivne micelle 29 Polielektrolitne četke 30 Polielektrolitni višestojevi kao membrane za nanofiltraciju |
|---|--|

Tablica sa seminarskim temama nalazi se na poveznici

<https://bit.ly/makromolekule2020>

i u nju u stupac C upišete vaše ime i prezime uz temu koju ste odabrali.

Molim vas da teme odaberete do petka 2. 5. do kraja dana i nakon toga mi pošaljete email gdje ćete u subject upisati naziv odabrane teme.

Ja ću vam odgovoriti na taj email s prijedlogom literature.