



Sveučilište u Zagrebu

**PRIRODOSLOVNO-MATEMATIČKI FAKULTET**  
**Kemijski odsjek**

Izrađen prema radu:

Y. Hashimoto et al, *J. Am. Chem. Soc.* **146** (2024) 23669-23673; doi: 10.1021/jacs.4c07193

# **KIROOPTIČKI AKTIVNI SUSTAVI S MICELARNIM KAPSULAMA TEMELJENIM NA TERPENIMA**

**KEMIJSKI SEMINAR 1**

**DOKTORSKI STUDIJ KEMIJE**

**FILIP GRDOVIĆ, INSTITUT RUĐER BOŠKOVIĆ**

**12.3.2024.**

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## Sadržaj

1. Kirooptički aktivni sustavi
2. Micelarne kapsule  $(MA)_n$
3. Pregled spektroskopskih tehnika
4. Građevni blokovi / prekursori
5. Micelarne kapsule
6. Micelarne kapsule + gosti
7. Zaključak

## □ Indukcija kiralnosti supramolekulskih sustava

□ Beskonačni helikalni niz

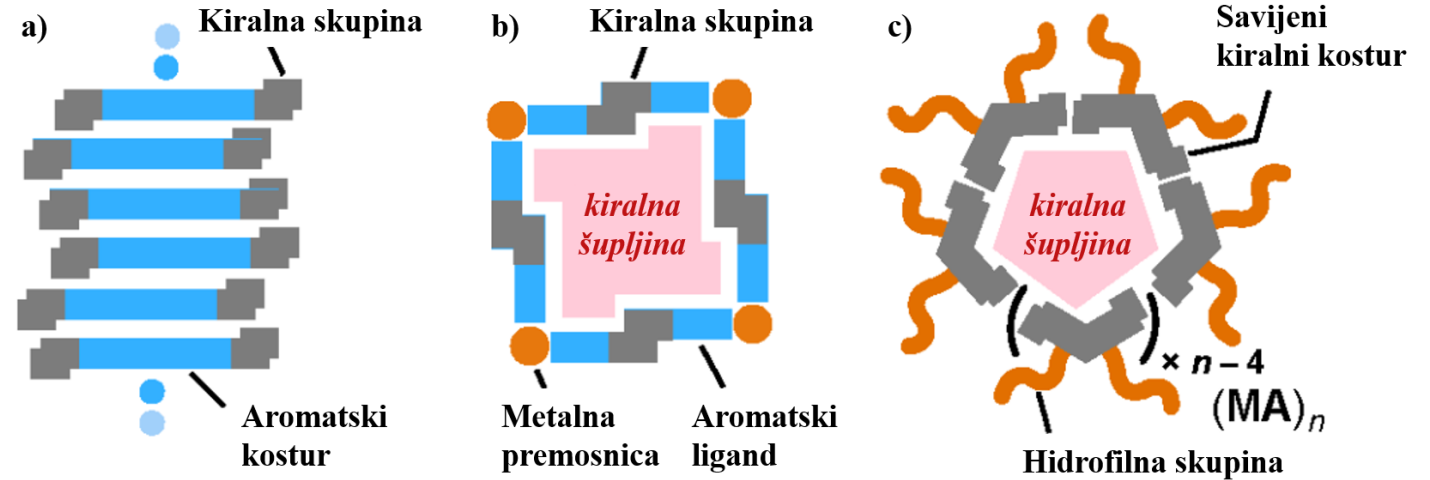
□ Koordinacijski kavezi

□ Micelarne kapsule

## □ Domaćin-gost kompleksi

□ Relativno rigidni okviri domaćina

□ Slabe interakcije domaćin-gost



## 2. MICELARNE KAPSULE (MA)<sub>N</sub>

### □ Hashimoto i suradnici razvili (MA)<sub>N</sub>

#### □ Amfifili na bazi terpena

□ Hidrofilni dio

□ Hidrofobni dio

### □ Svojstva:

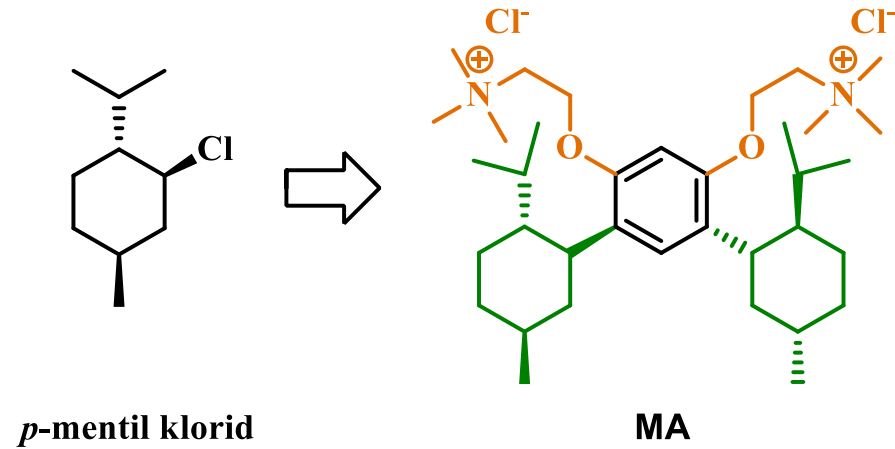
□ Fleksibilna kiralna šupljina

□ Sposobnost prihvata akiralnih fluorescentnih boja

□ Različite veličine gostiju

□ Prijenos kiralnosti sa kapsule na goste

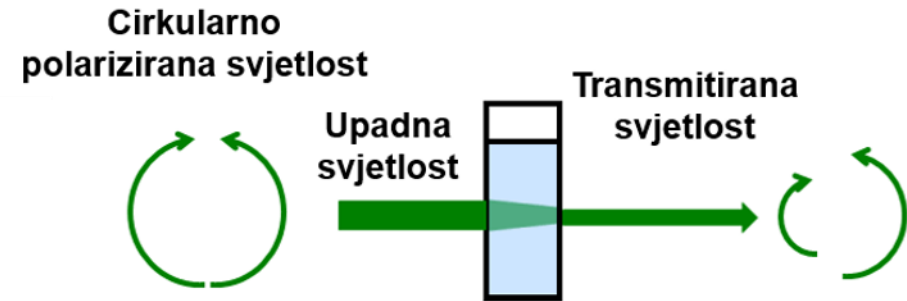
□ Vodeni medij



### 3. PREGLED SPEKTROSKOPSKIH TEHNIKA

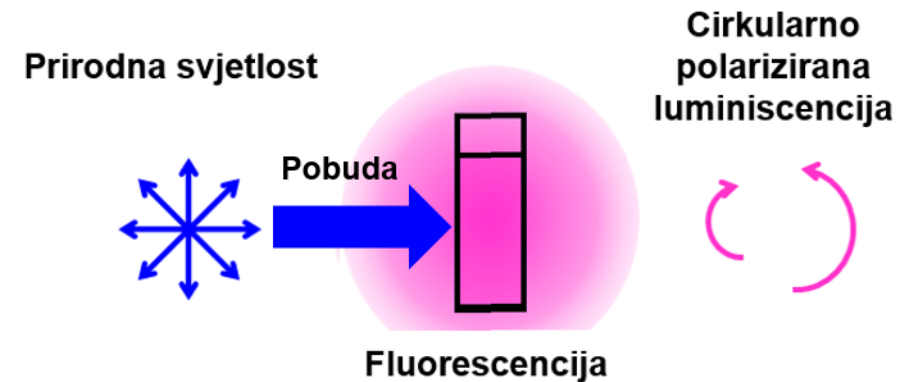
#### 3.1. Spektroskopija cirkularnog dikroizma (CD)

- Elektronska spektroskopija
- Različita apsorpcija lijevo i desno cirkularno polarizirane svjetlosti



#### 3.2. Spektroskopija cirkularno polarizirane luminiscencije (CPL)

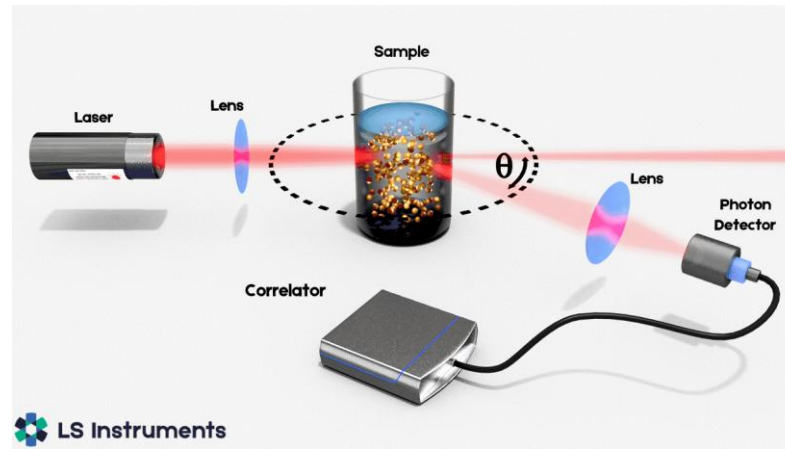
- Fluorescencijska spektroskopija
- Razlika intenziteta lijevo i desno cirkularno polarizirane fluorescencije



### 3. PREGLED SPEKTROSKOPSKIH TEHNIKA

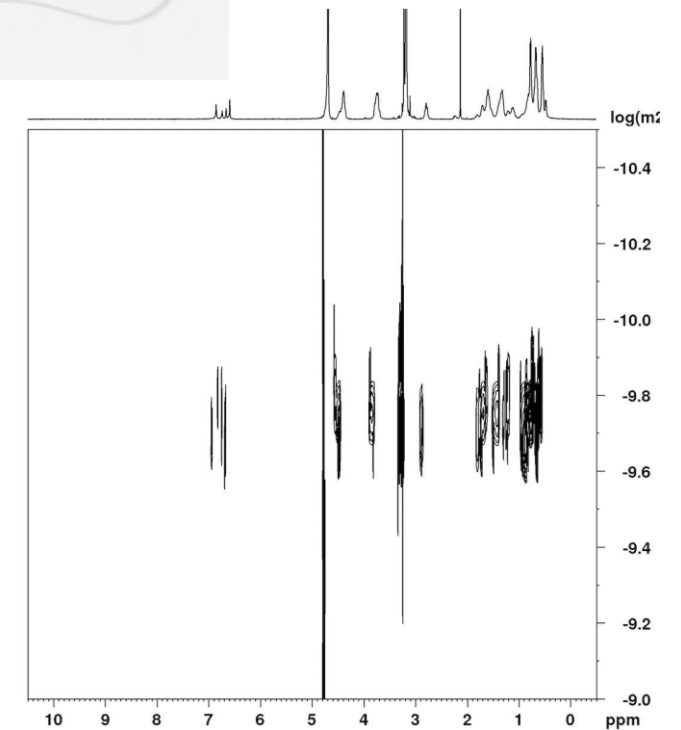
#### 3.3. Dinamičko raspršenje svjetlosti (DLS)

- ❑ Mjerenje veličine čestica u otopini
- ❑ Difuzijski koeficijent → hidrodinamički radijus
- ❑ Statistička raspodjela veličina

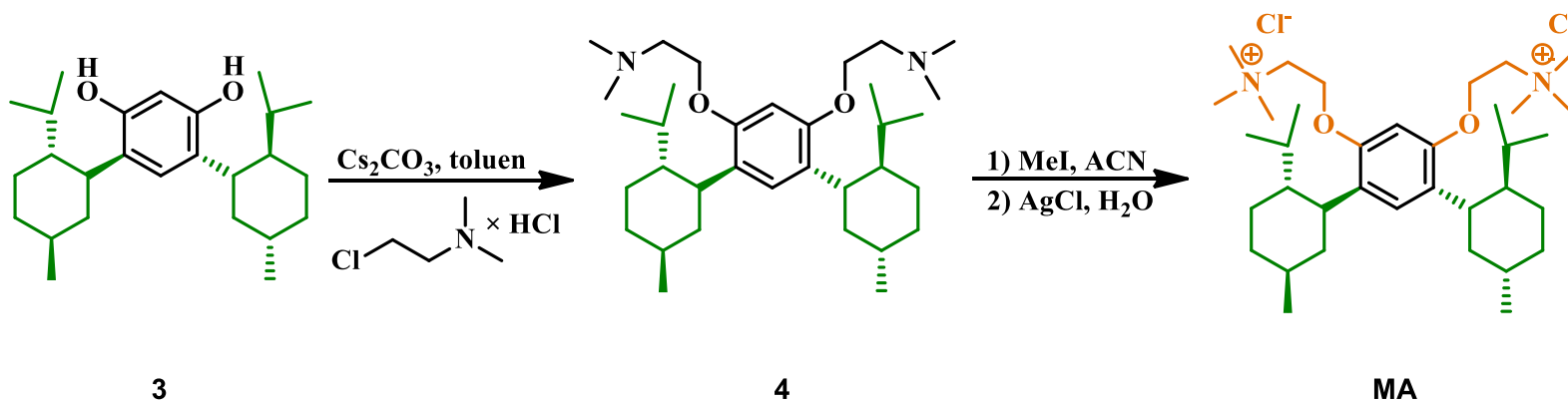
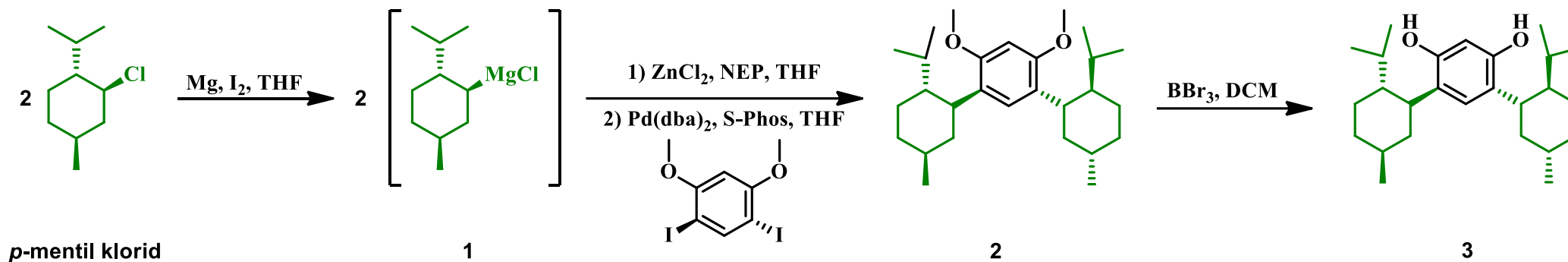


#### 3.4. DOSY NMR (engl. *Diffusion-Ordered Spectroscopy*)

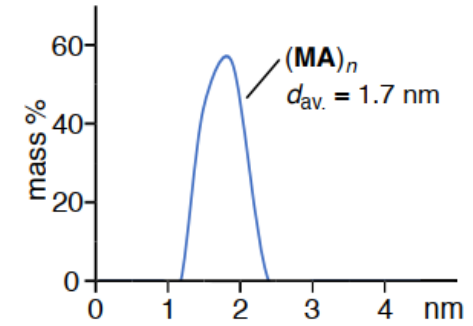
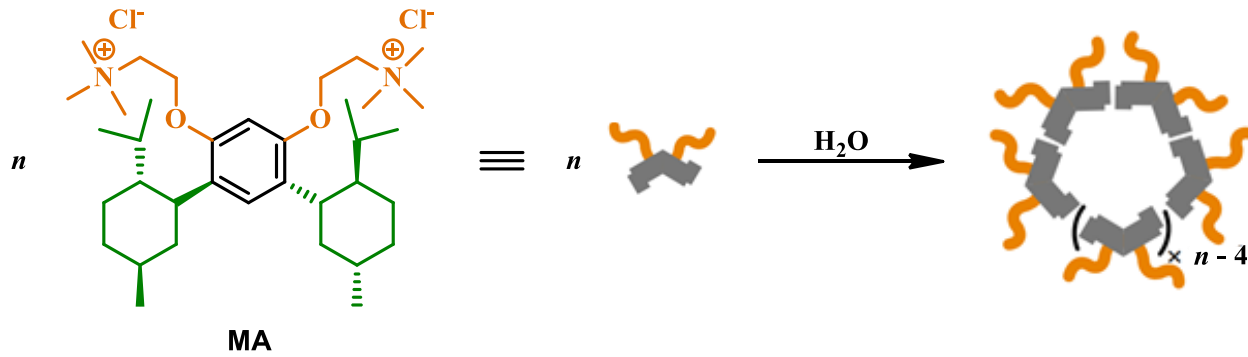
- ❑ Mjerenje veličine specija u otopini
- ❑ Difuzijski koeficijent → hidrodinamički radijus
- ❑ Moguće razlikovati vrste u smjesi



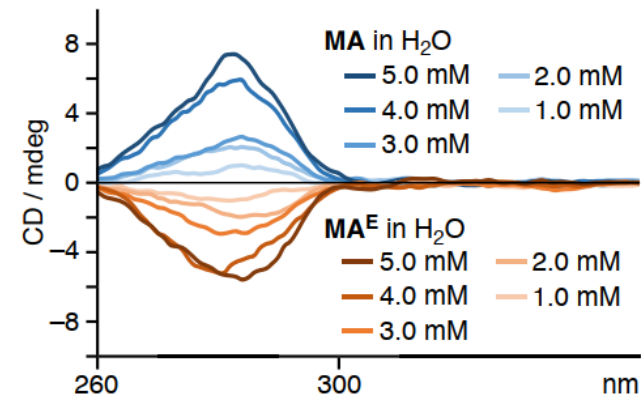
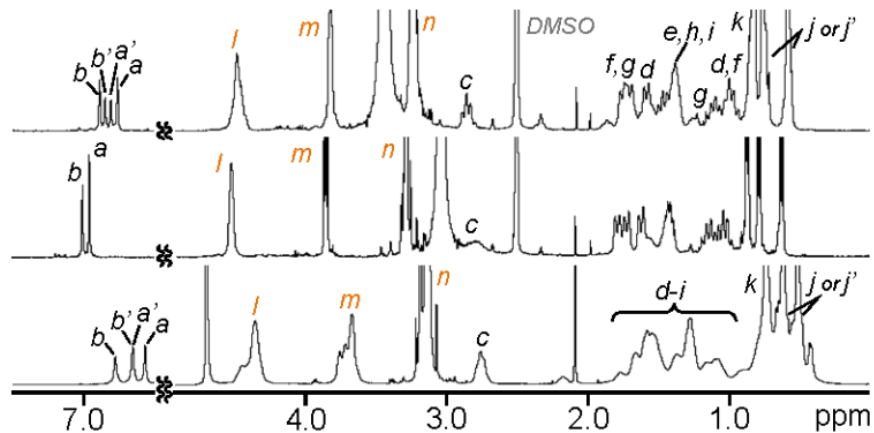
## 4. GRAĐEVNI BLOKOVI / PREKURSORI



# 5. MICELARNE KAPULE

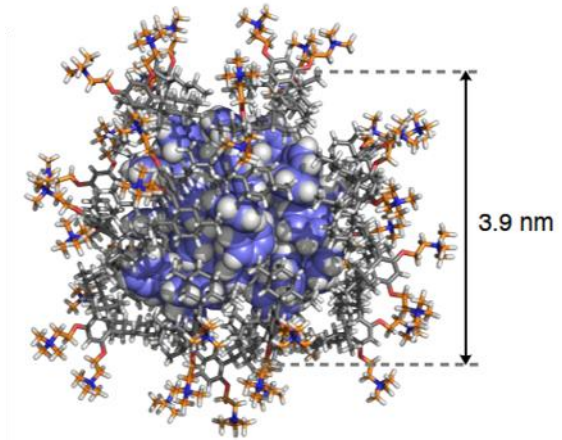
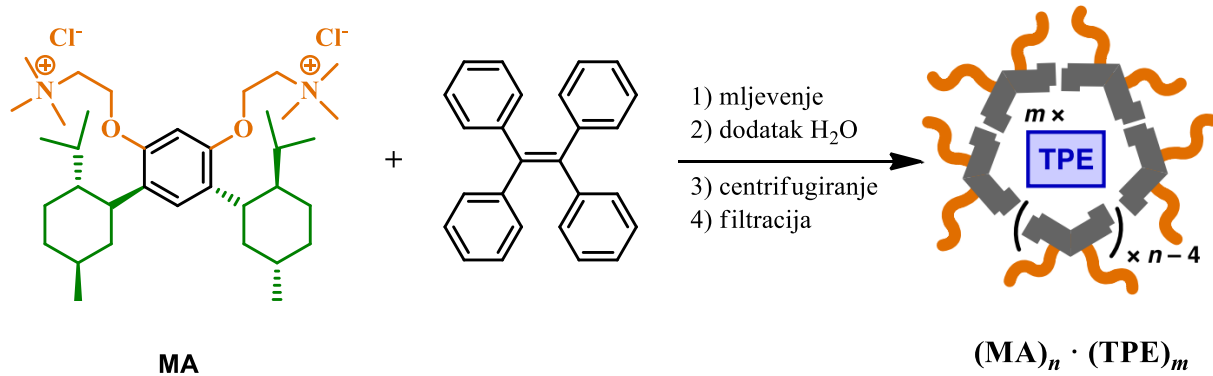


DOSY:  $d = 2,0 \text{ nm}$

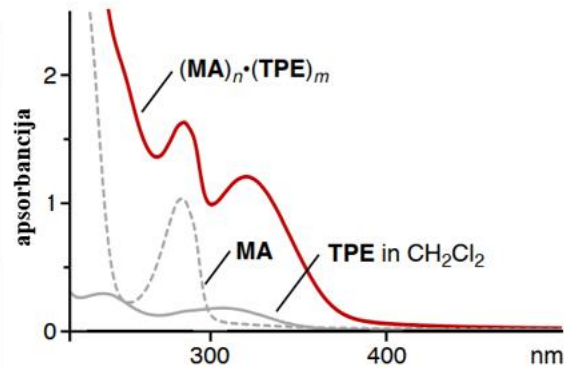




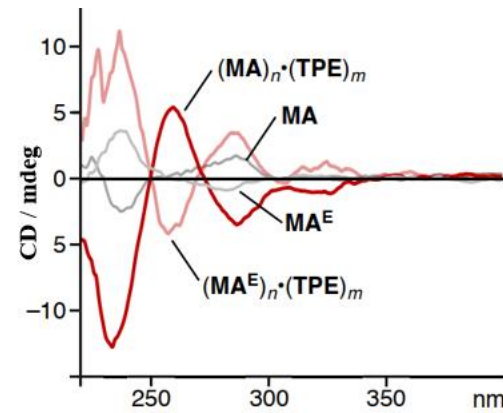
## 6. MICELARNE KAPSULE + GOSTI



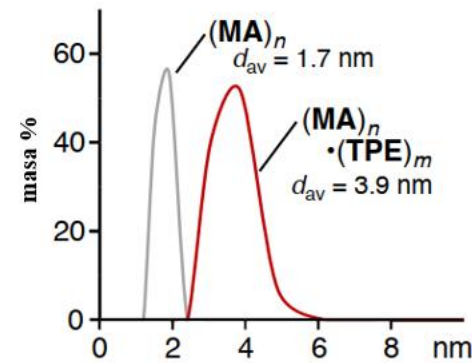
DFT  
 $(MA)_{21} \cdot (TPE)_{12}$



UV-Vis

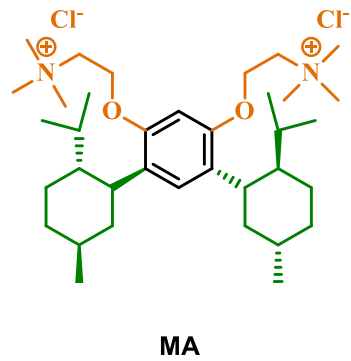


CD



DLS

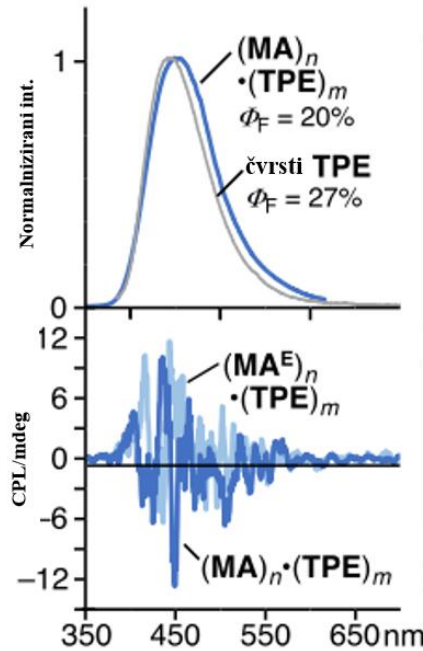
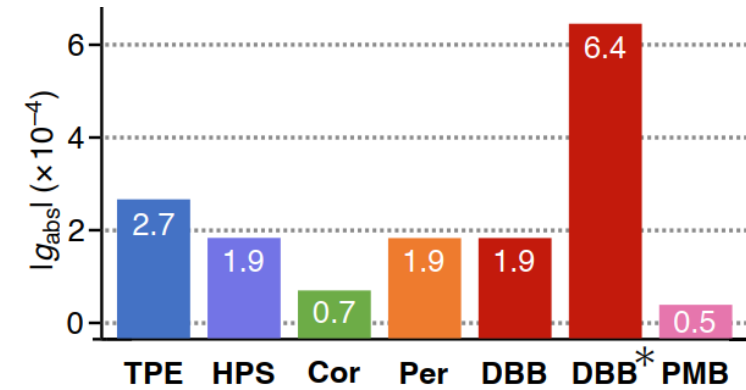
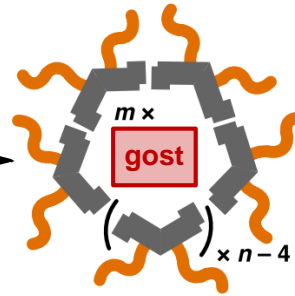
## 6. MICELARNE KAPSULE + GOSTI



+

gost

- 1) mljevenje
- 2) dodatak H<sub>2</sub>O
- 3) centrifugiranje
- 4) filtracija



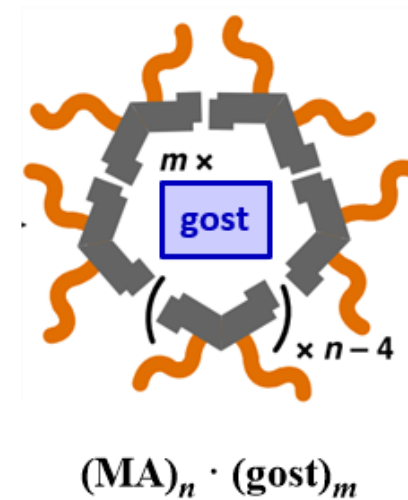
PL i CPL

### Emisija izazvana agregacijom (AIE)

L. J. Chen, H.-B. Yang, M. Shionoya, *Chem. Soc. Rev.* 46 (2017) 2555–2576.

- Pojačanje fluorescencije u agregiranom stanju
- Suprotnost većini spojeva
- Dodatna potvrda inkapsulacije gosta u micelu

- ✓ Jednostavna priprema kompozita definirane strukture
- ✓ Definirana i fleksibilna kiralna šupljina
- ✓ Kompoziti domaćin-gost u vodi, bez kovalentne funkcionalizacije gosta
- ✓ Učinkovita platforma za prijenos kiralnosti



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**HVALA NA PAŽNJI 😊**