

Universitatea
Babes Bolyai
Cluj Napoca

Institutul de
Cercetari
Interdisciplinare
Experimentale



Investigarea constantei de legatura a bioconjugatelor BSA-nanoparticule de aur prin spectroscopia LSPR si fluorescenta

M. Iosin¹, F. Toderas¹, P.L. Baldeck² and S. Astilean¹

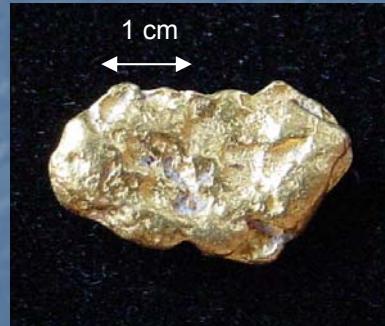
1. Institutul de Cercetari Experimentale Interdisciplinare, Laborator de Nanobiofotonica, Universitatea Babes Bolyai,
T.Laurian, Cluj-Napoca

2. Laborator de Spectrometrie Fizica, Grenoble, Franta

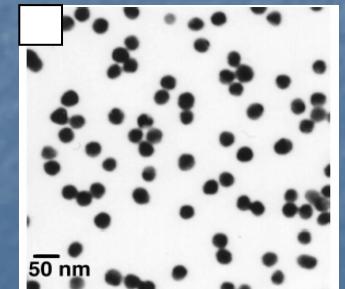
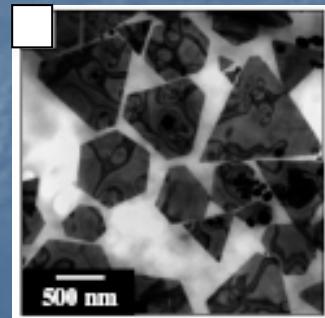
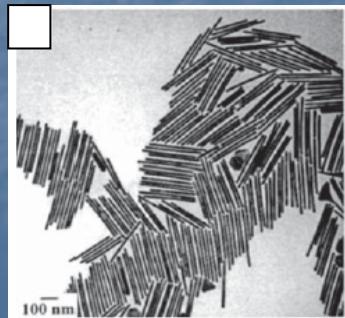
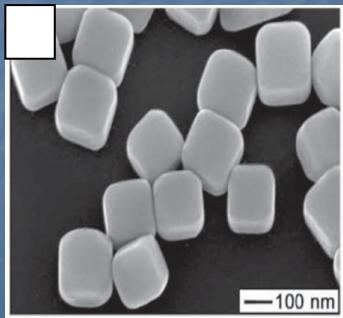
A 7-a editie a Seminarului National de nanostiinta si nanotehnologie
20 martie 2008, Bucuresti

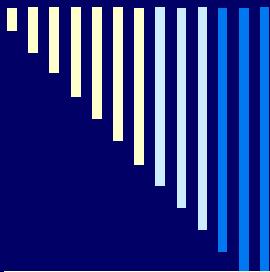
Nanoparticule de aur

Aur la scară macroscopică
(bulk)

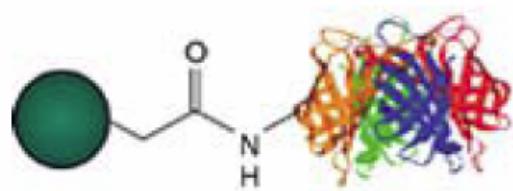


Aur la scară nanometrică
(nanoparticule)

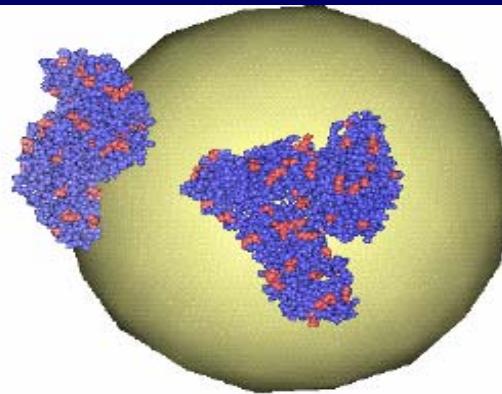




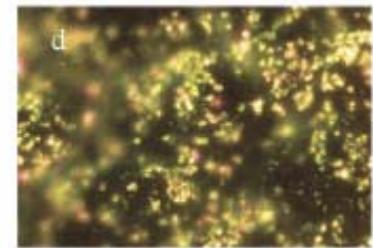
Aplicații în bioplasmonică: detectia biomoleculelor și controlul unor efecte fotofizice în sisteme biologice



Easy binding to Bio Molecules

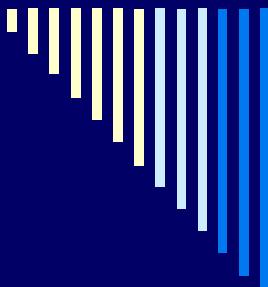


Delivery Vector

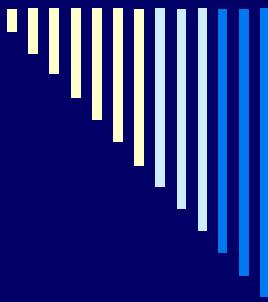


Cancer Therapy

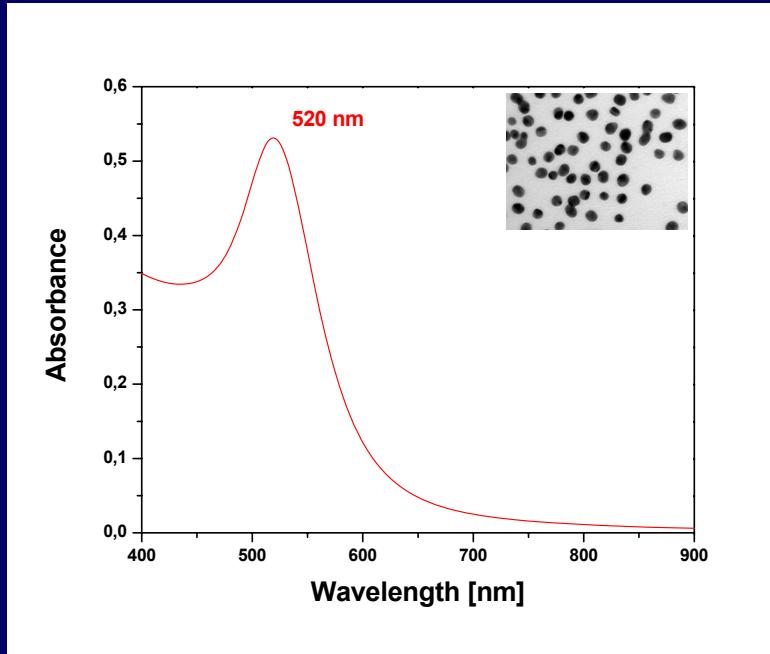
1. Detectia optică biochimică prin LSPR (Localized Surface Plasmon Resonances)
2. SERS (Spectroscopia Raman amplificată de suprafață)
3. SEIRA (Spectroscopia de absorbtie in IR amplificată de suprafață)
4. Spectroscopia amplificată de fluorescentă



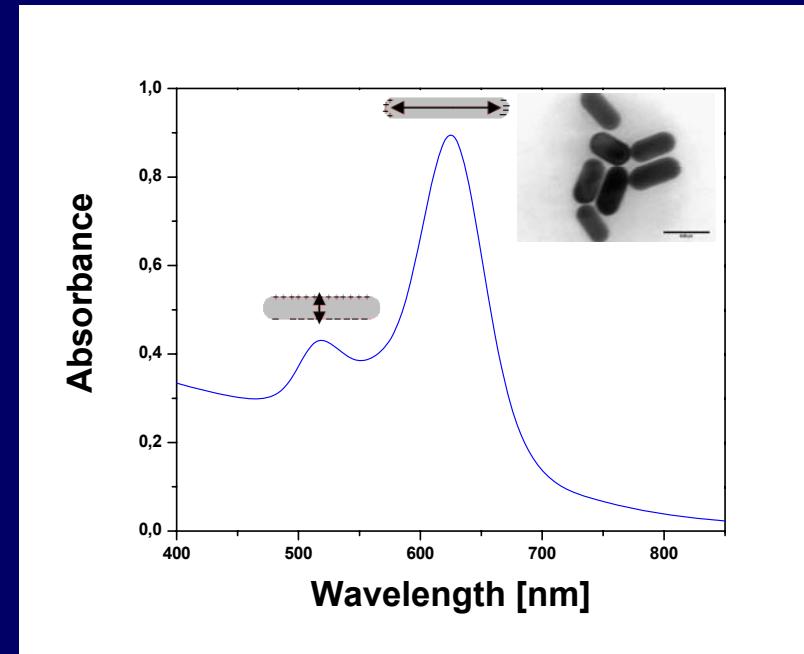
Determinarea constantei de legatura dintre
proteine si nanoparticule de aur (sfere si
bastianase) prin Spectroscopie LSPR si
Fluorescenta



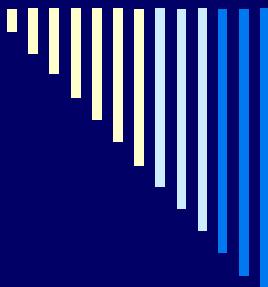
Proprietăți optice ale nanosondelor de aur



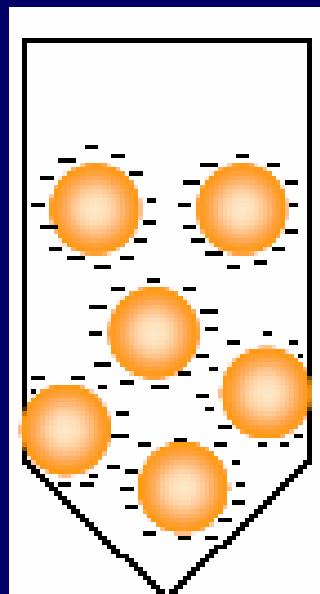
Spectrul de absorbție UV-VIS soluției coloidale de aur



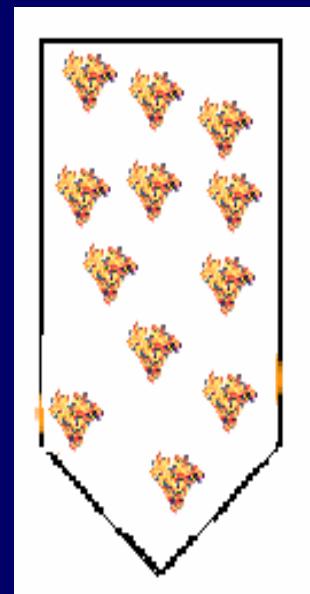
Spectrul de absorbție UV-VIS ale soluției de bastonase de aur



Prepararea bioconjugatelor BSA- nanoparticulelor de aur (GNP)

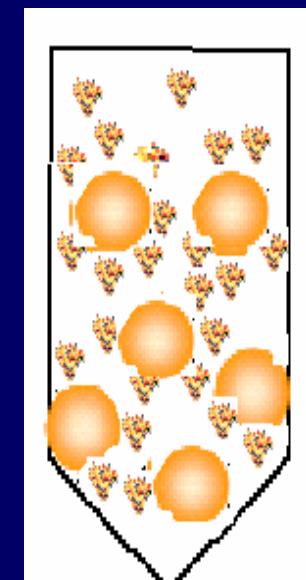


+



BSA

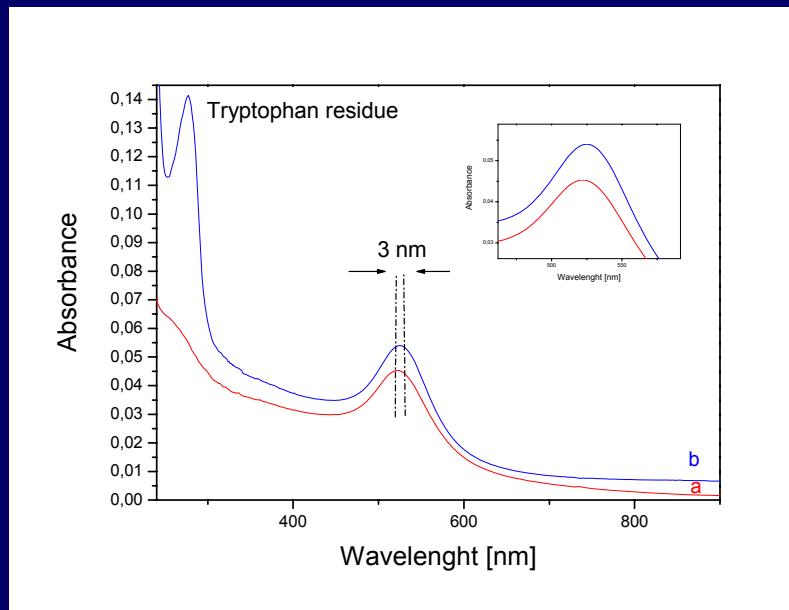
Nanoparticule de aur



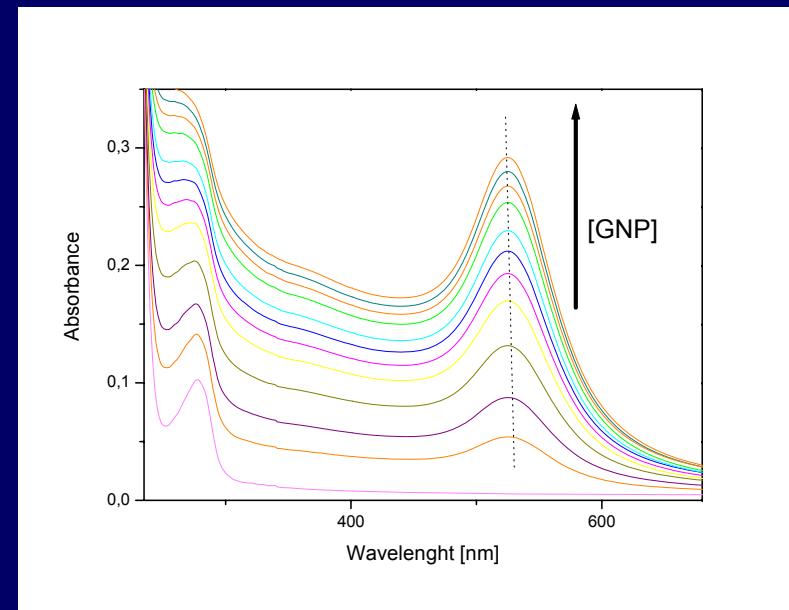
Bioconjugate BSA - nanoparticule de aur

Detectie interactiunii GNP-BSA prin LSPR

1. BSA-Nanosfere de aur

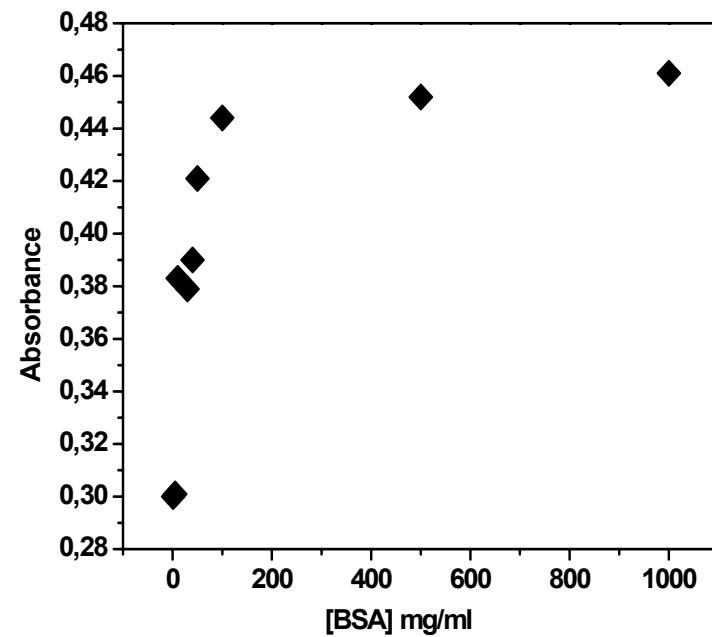
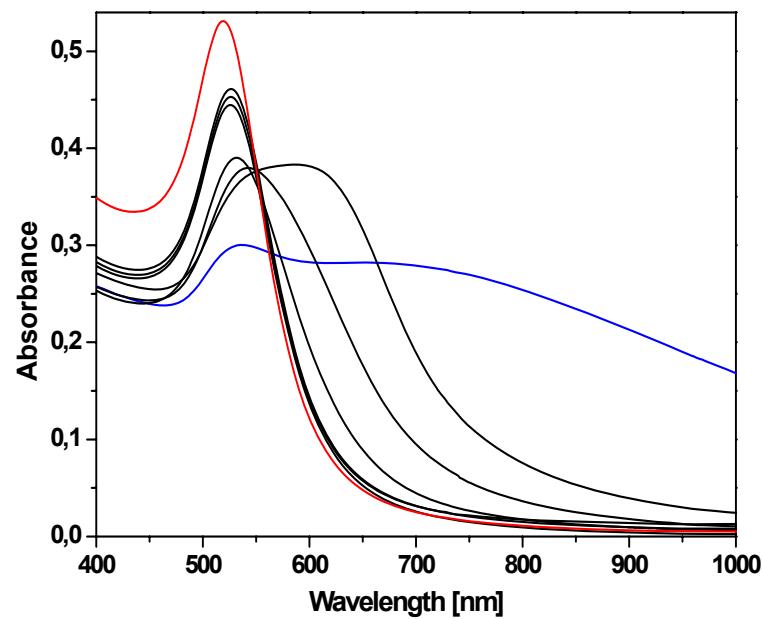


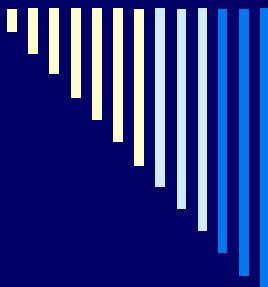
Spectrele de absorbție UV-VIS ale coloidului de aur (a) și ale conjugatelor BSA-nanoparticule de aur (b)



Spectrele de absorbție UV-VIS ale soluției apoase de BSA (a) și ale conjugatelor BSA-nanoparticule de aur diferite concentratii (b-g)

Test de anticoagulare

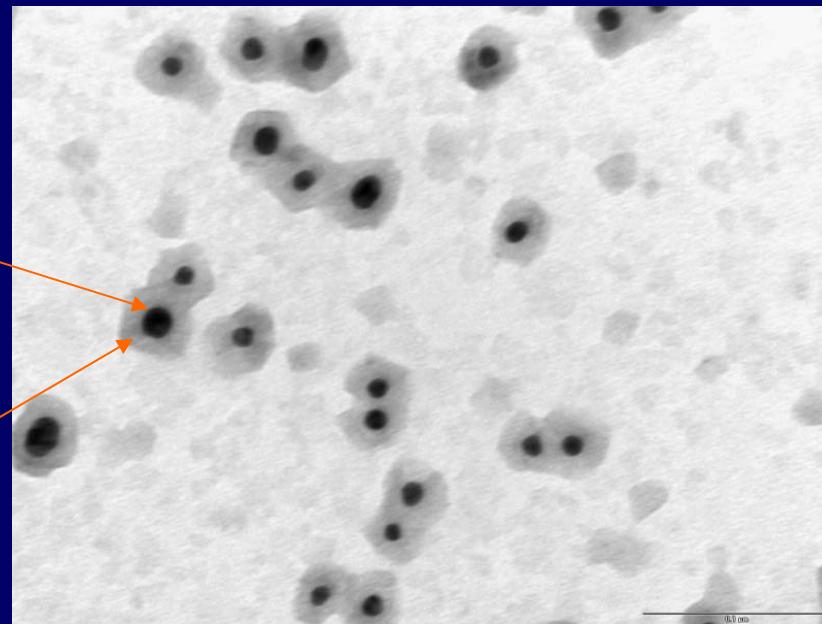




Caracterizarea bioconjugatelor BSA- nanosfere de aur prin TEM

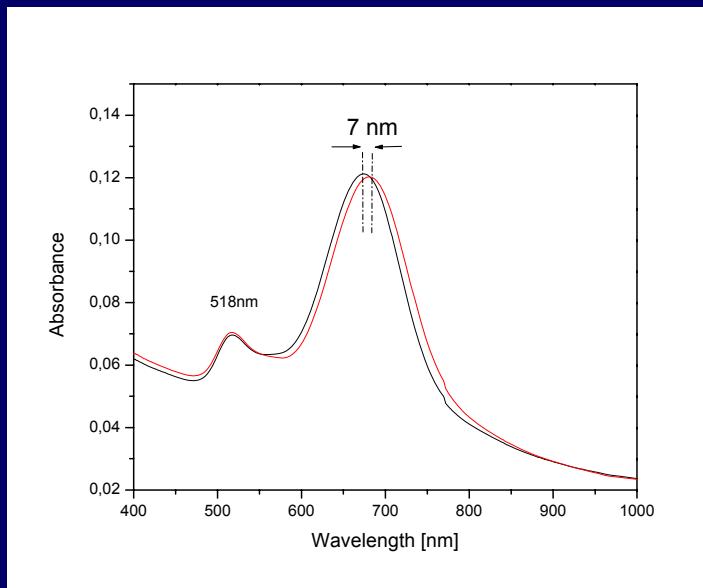
Au

BSA

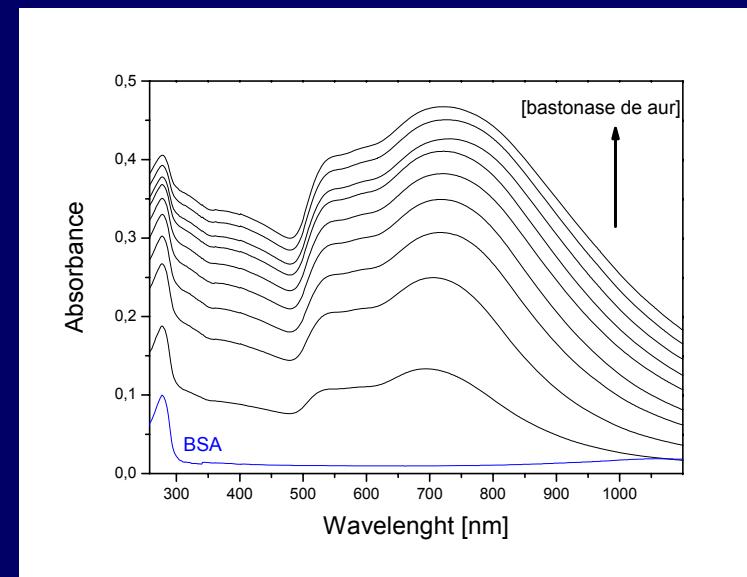


Detectie interactiunii GNP-BSA prin LSPR

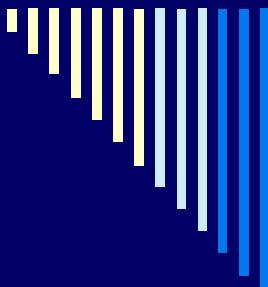
2. BSA-Nanobastonase de aur



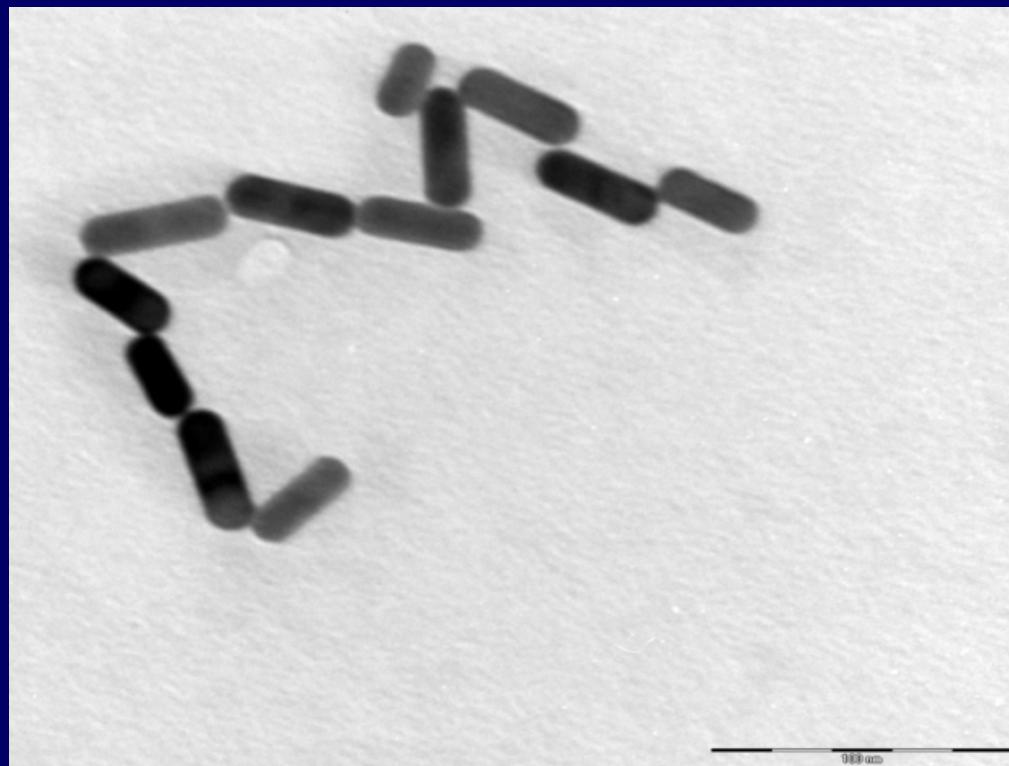
Spectrele de absorbție UV-VIS ale bastonaselor de aur și ale conjugatelor BSA-bastonase de aur (rosu)



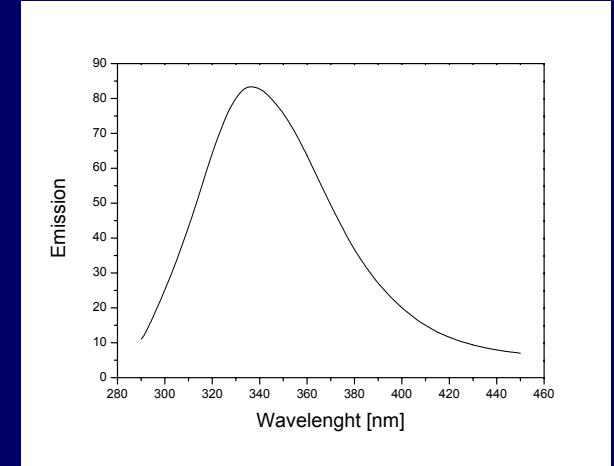
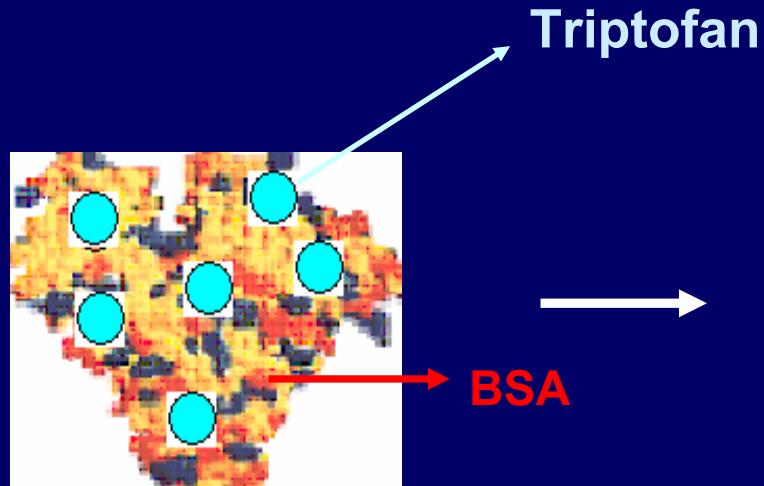
Spectrele de absorbție UV-VIS ale soluției apoase de BSA (albastru) și ale conjugatelor BSA-bastonase de aur diferite concentratii



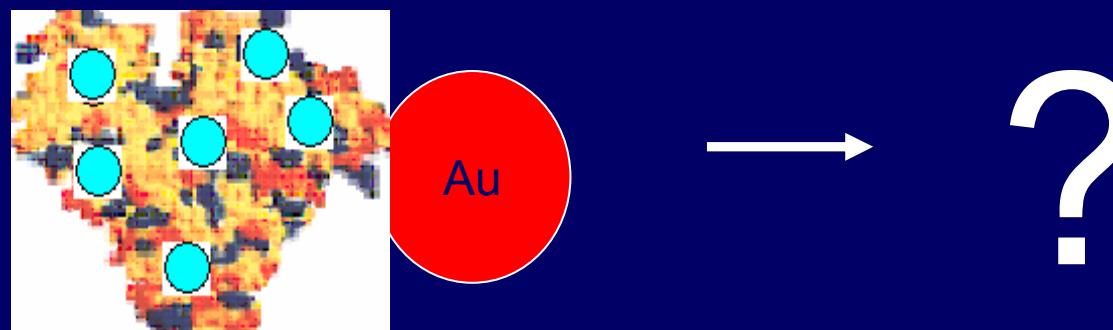
Caracterizarea bioconjugatelor BSA-bastonase de aur prin TEM



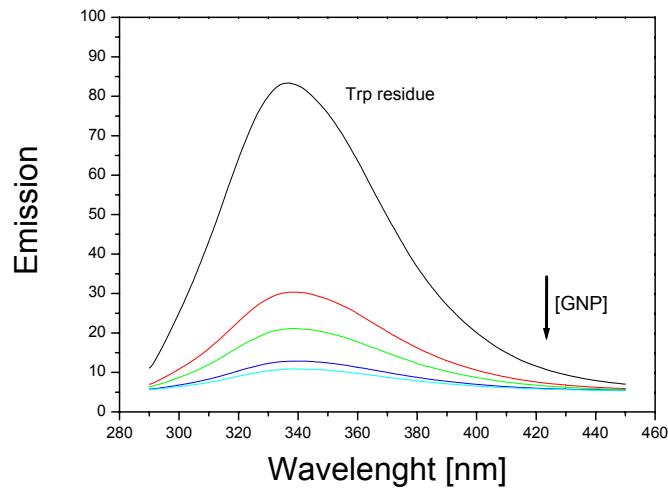
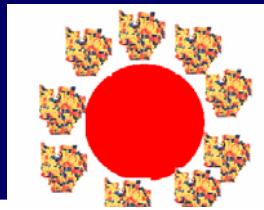
Detectia interactiunii BSA- GNP prin quenching de fluorescenta



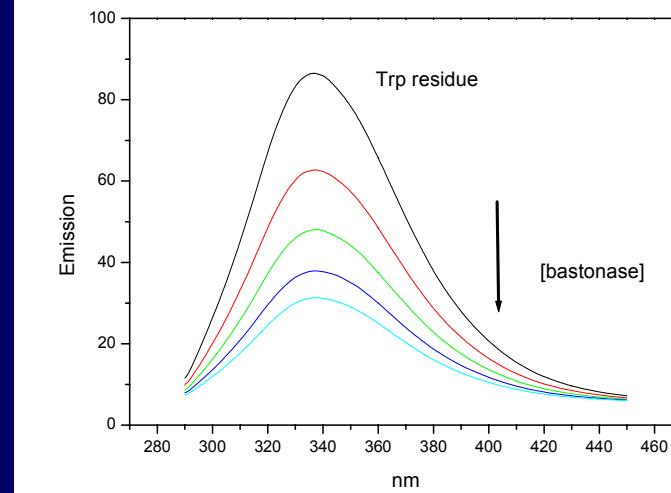
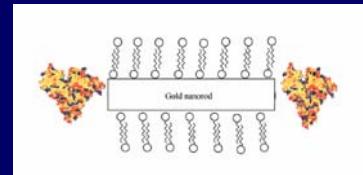
Emisia de fluorescenta a rezidurilor triptofan din BSA



Detectia interactiunii BSA- GNP prin quenching de fluorescenta



Spectrul de emisie a bioconjugatelor BSA – nanosfere de aur excitand la 280 nm.

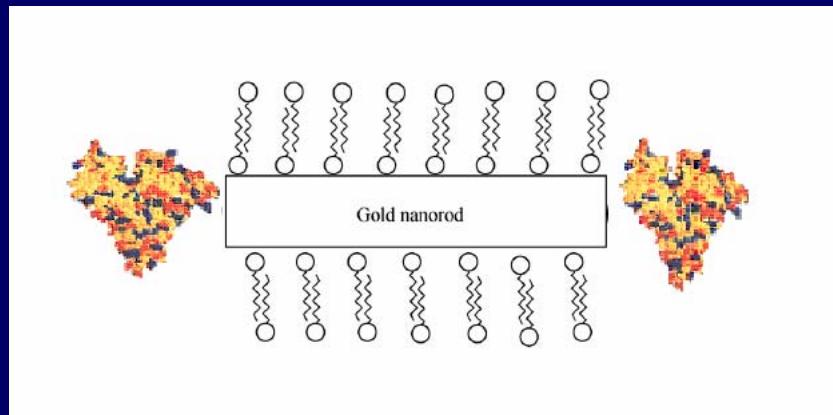


Spectrul de emisie a bioconjugatelor BSA – nanobastonaselelor de aur excitand la 280 nm.

Calculul constantei de legatura BSA-GNP

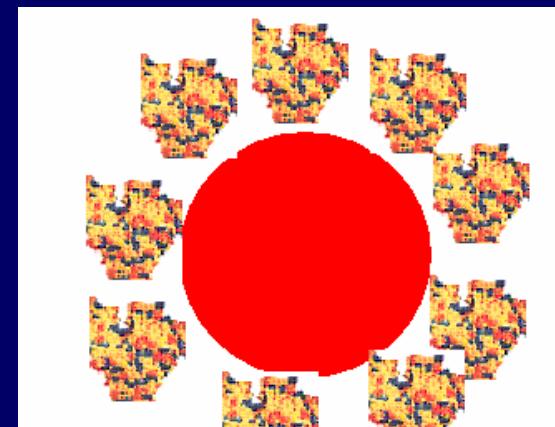
$$(F_0 - F)/(F - F_\infty) = ([M]/K_{\text{diss}})^n.$$

$$K_{\text{diss}} = 1/k_b$$



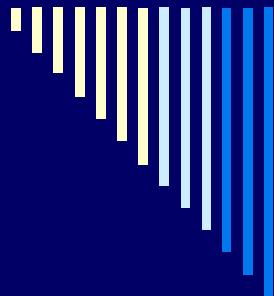
$$n = 0.38$$

$$K_b = 0.5 \times 10^5$$



$$n = 1.37$$

$$K_b = 2.34 \times 10^{11}$$



Concluzii

1. Utilizand spectroscopia LSPR s-a demonstrat atasarea proteinei de nanoparticulele de aur:

sfere: BSA s-a atasat pe toata suprafata nanoparticulei

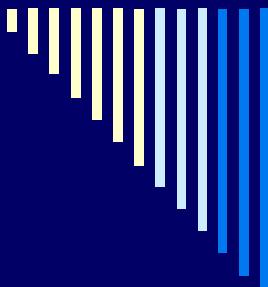
bastonase: BSA s-a atasat pe capete

2. Utilizand spectroscopia de fluorescenta s-a calculat constanta de legatura a proteinei de nanoparticulele de aur:

sfere: $n = 1.37$, $K_b = 2.34 \times 10^{11}$

bastianase : $n = 0.38$, $K_b = 0.5 \times 10^5$

**Multumiri pentru suportul financiar acordat de ANCS in cadrul proiectului CEEX
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VA MULTUMESC!
