LSPR TRANSDUCERS FOR SENSING PROTEIN-CARBOHYDRATE INTERACTIONS

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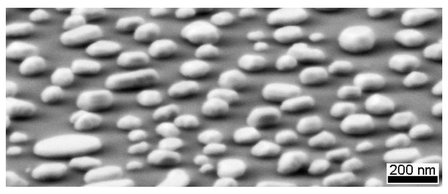
Introduction

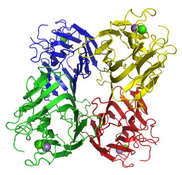
Ultrathin gold island films prepared by evaporation on glass slides and annealing, combined with synthetically-modified carbohydrates, are used to develop localized surface plasmon resonance (LSPR) transducers for monitoring and imaging of protein-carbohydrate interactions. Specific recognition of mannose by Concanavalin A (Con A) is presented as a model for sensing using stationary and dynamic configurations.

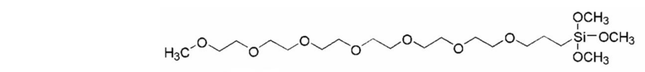
Materials



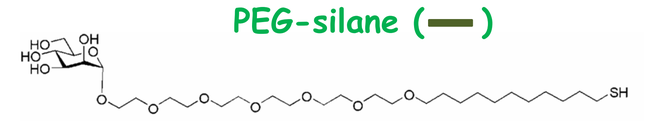
Gold island film ( )

Concanavalin A ( )

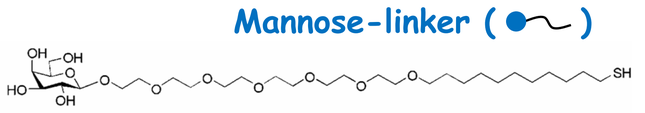




PEG-silane ( )

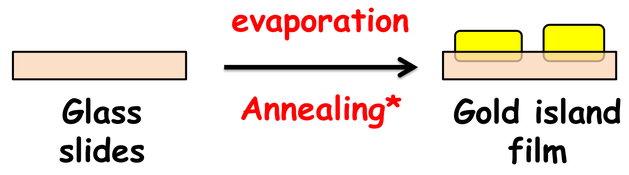


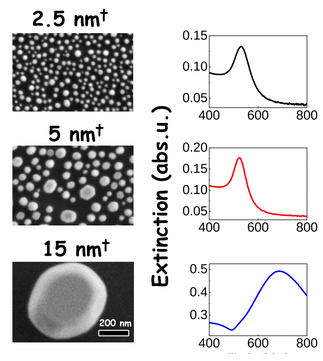
Mannose-linker ( )



Galactose-linker ( )

Preparation of LSPR transducers

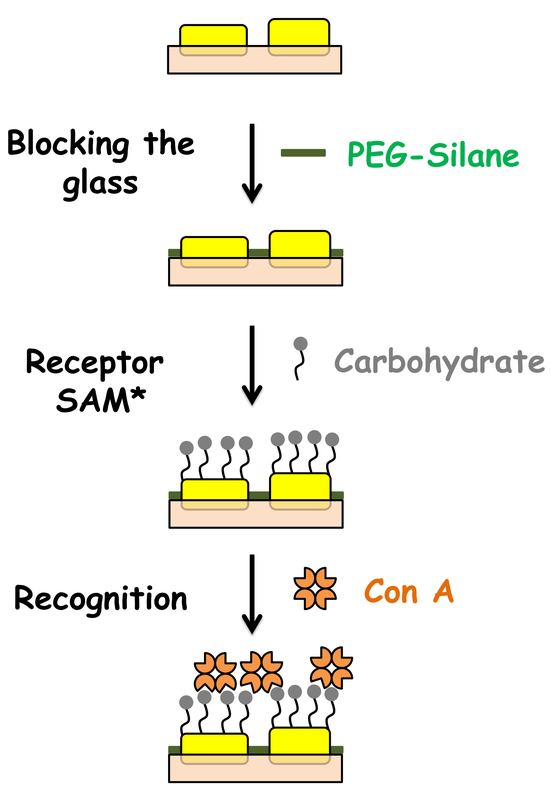




* 10 hours at 570 C.

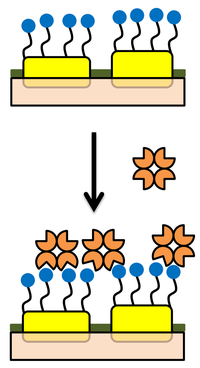
† Nominal thickness of the initially evaporated film.

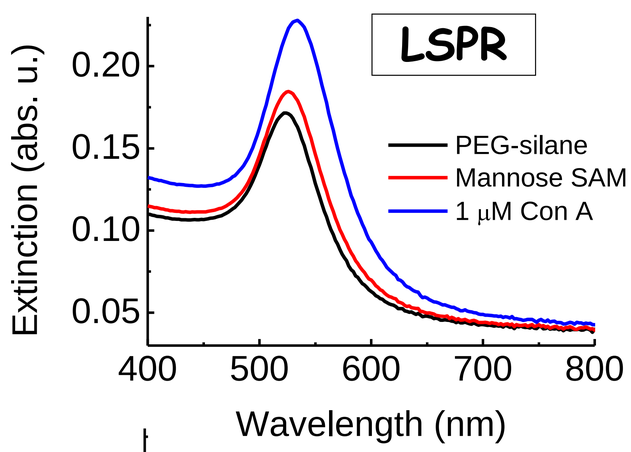
Sensing scheme

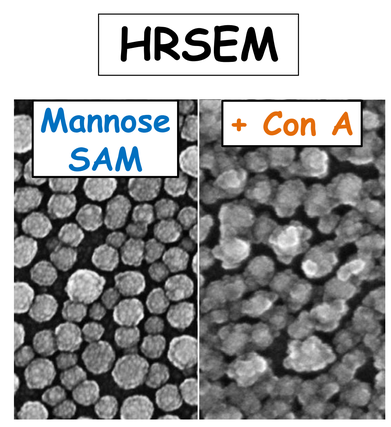


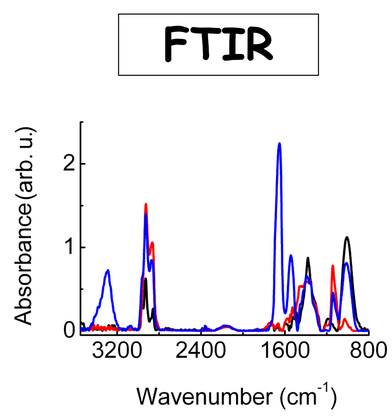
*SAM = self assembled monolayer

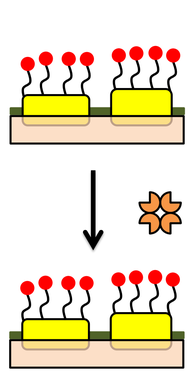
Sensing of Con A – carbohydrate interactions

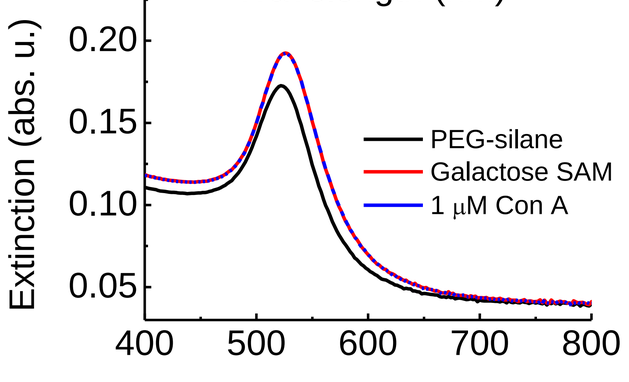


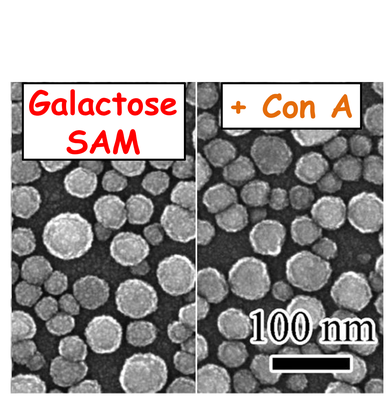


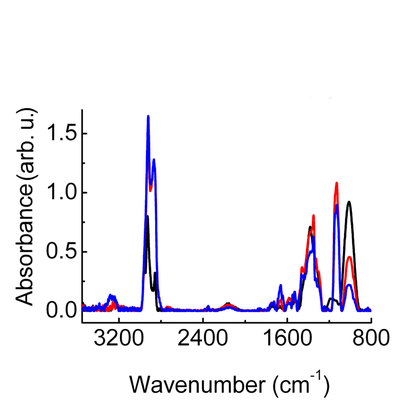




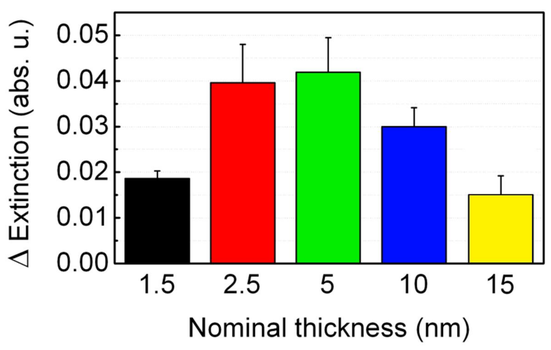


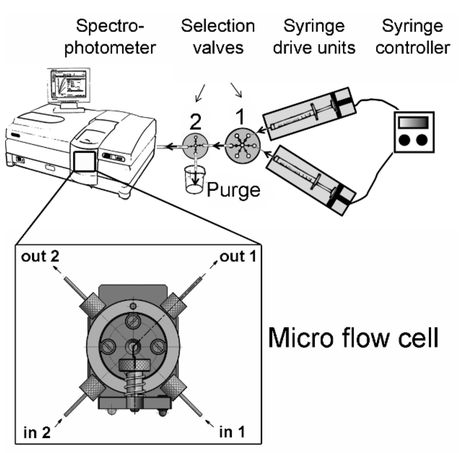




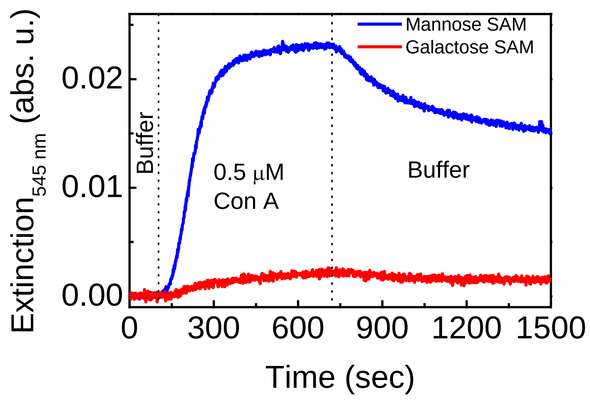


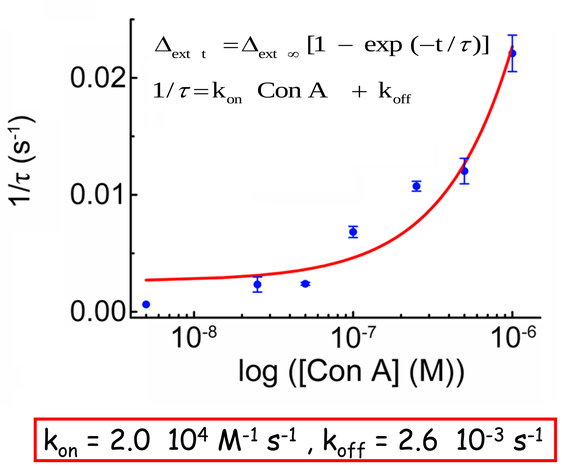
Optimization





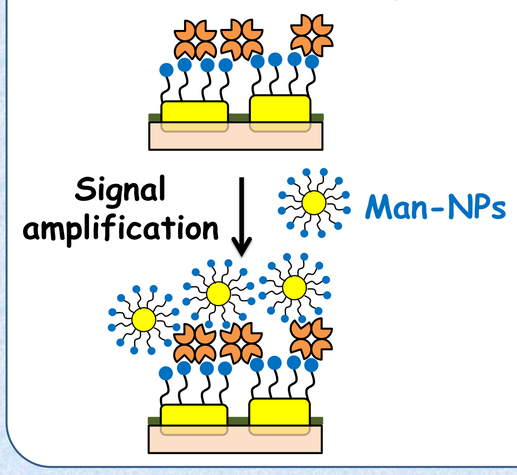
Con A binding kinetics

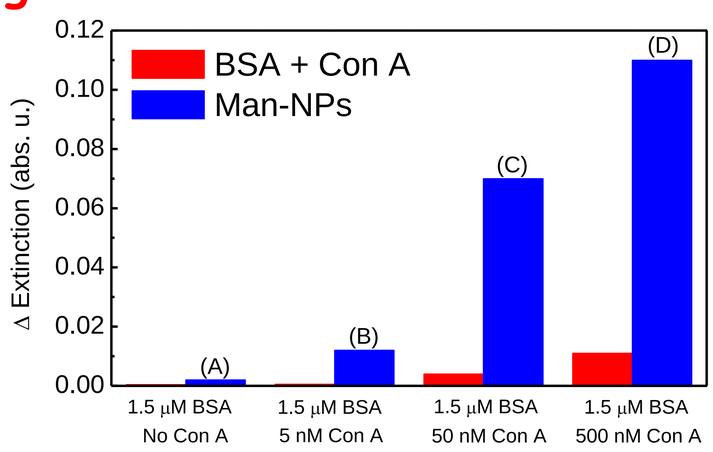


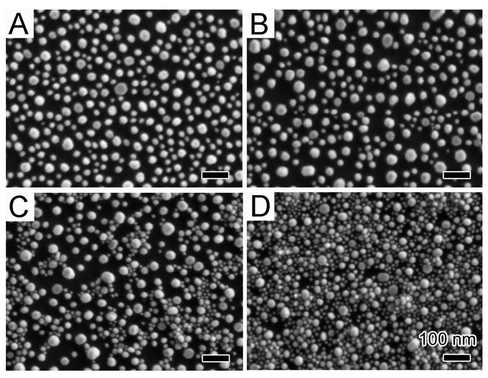


k_{on} = 2.0 10^4 M^{-1} s^{-1} , k_{off} = 2.6 10^{-3} s^{-1}

Enhancement of the signal and detection limit with Mannose-nanoparticles







Conclusion

- ✓ Simple preparation of the tranducers.
- ✓ Highly specific response.
- ✓ Determination of kinetic parameters.
- ✓ Low detection limit.