

NanoCrafters

BITS Pilani, India

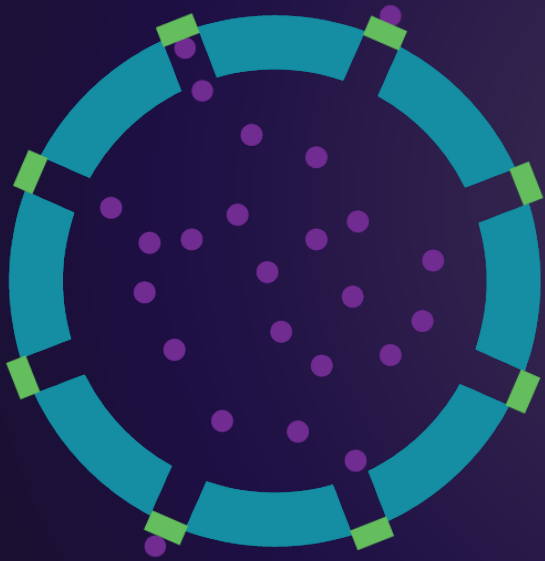
Applicable everywhere

Universal Biosensor Design

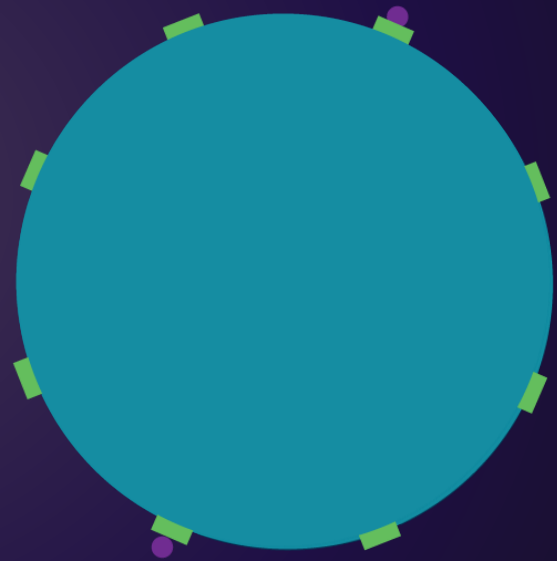
*Use biological elements
for sensing*

BASIC DESIGN

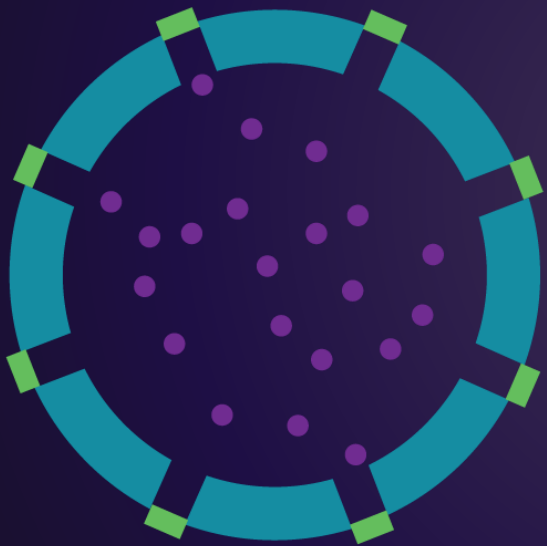
Cross section



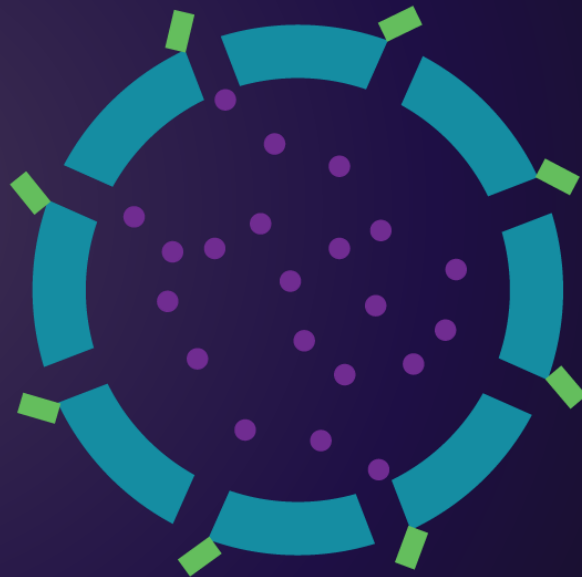
Outer Surface

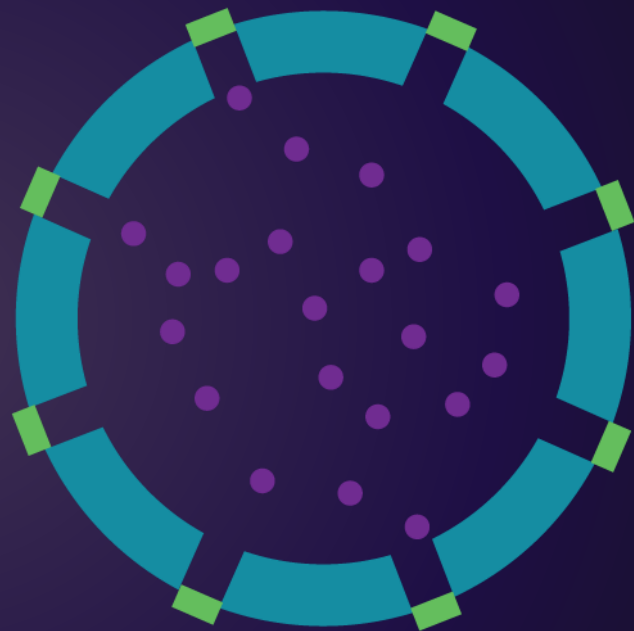
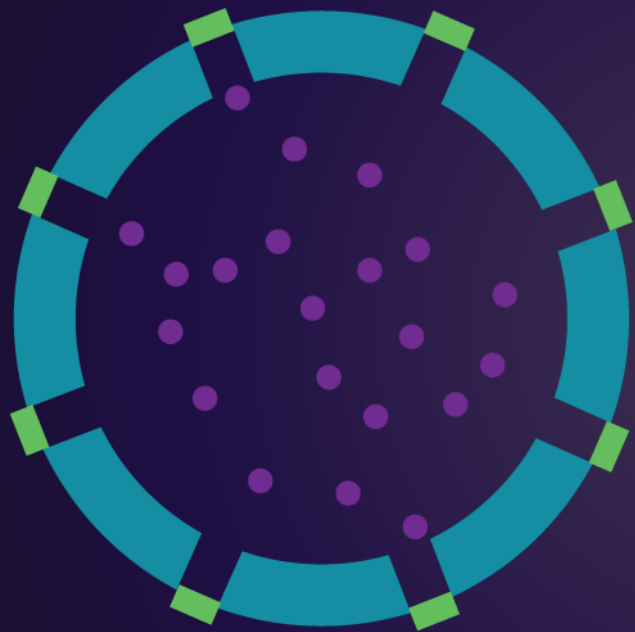


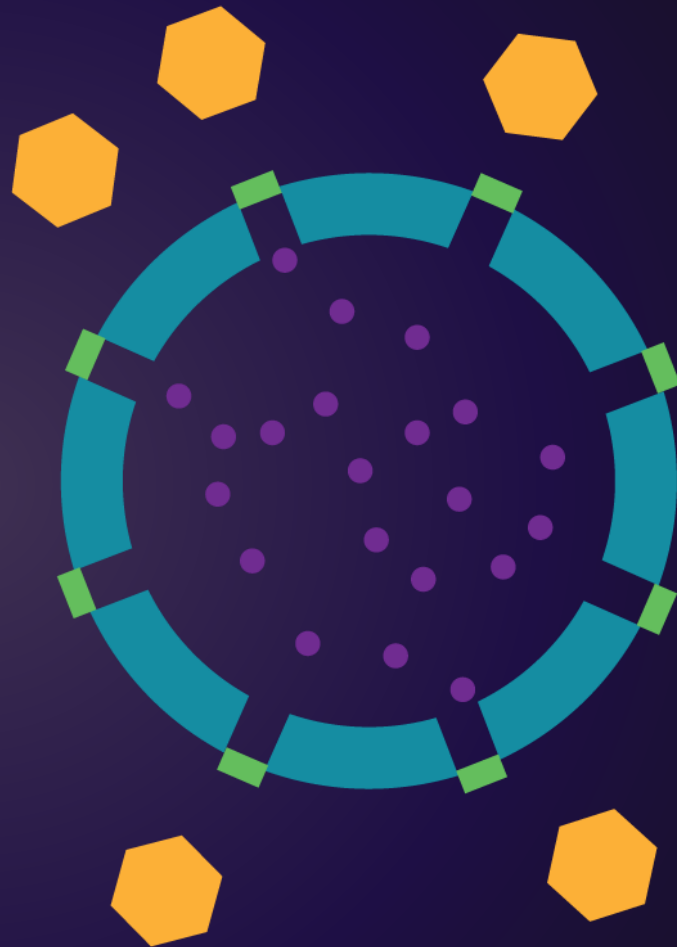
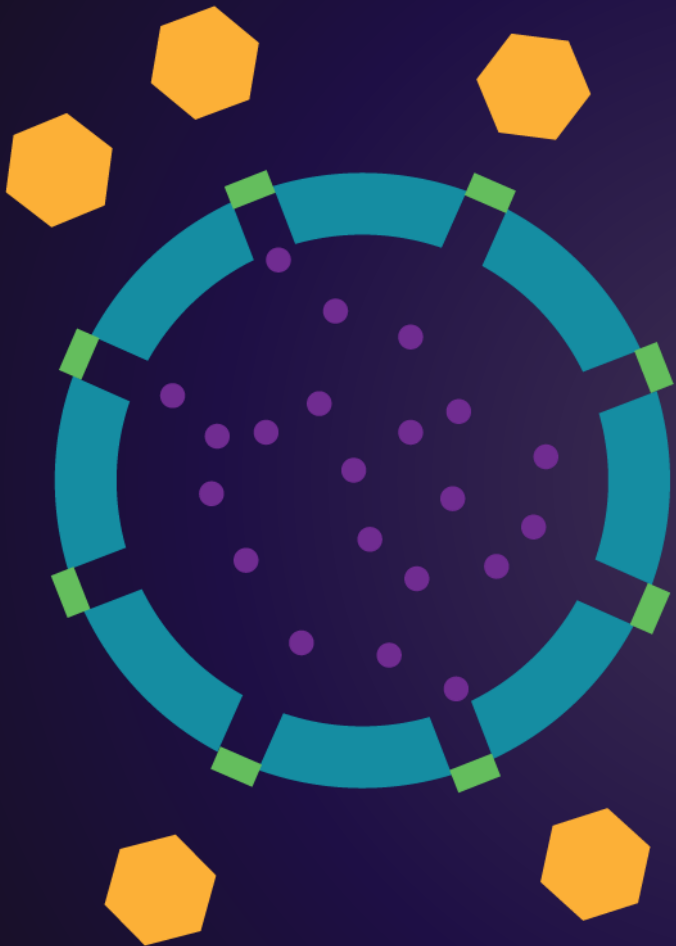
Target absent

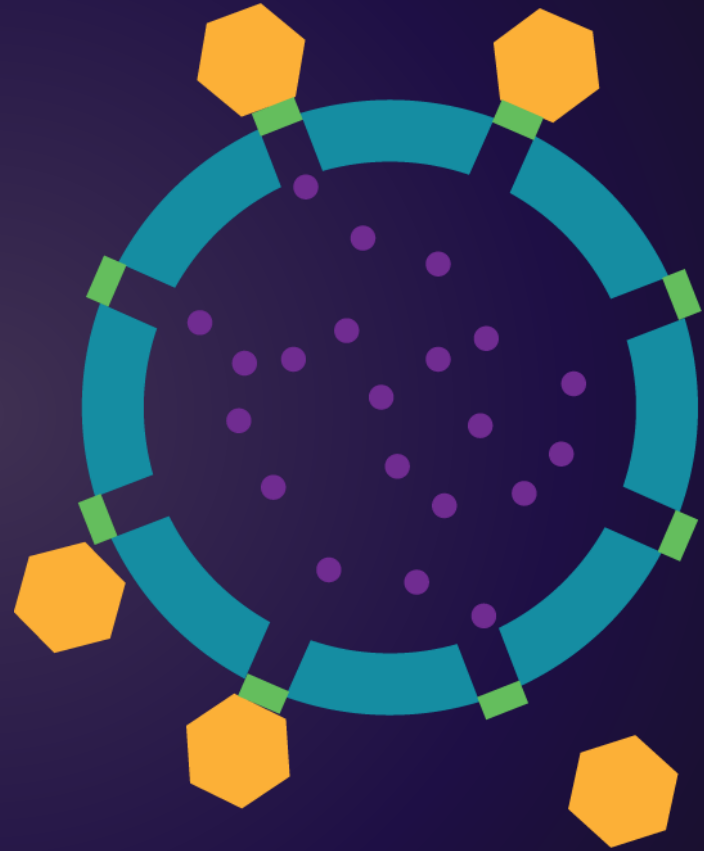
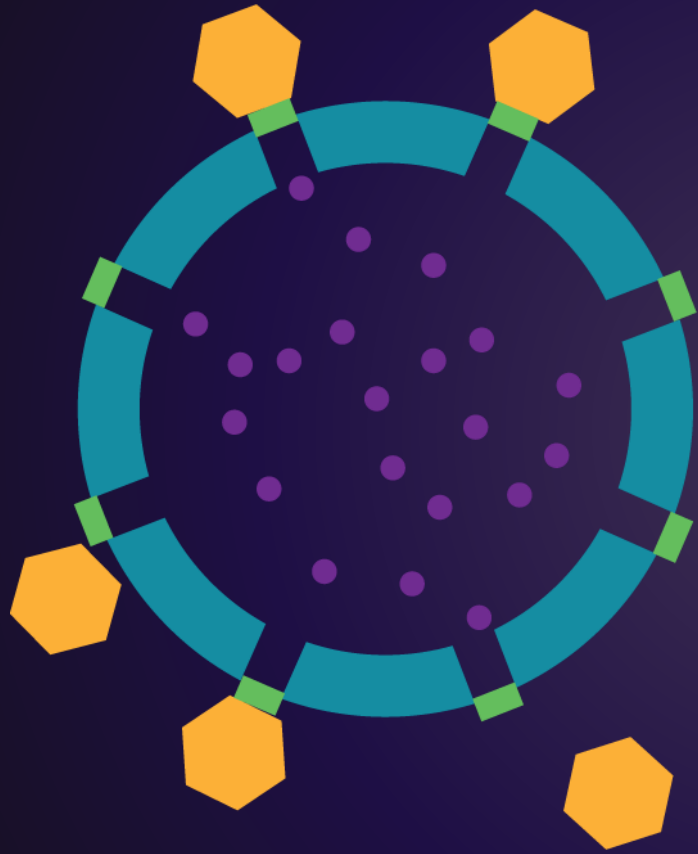


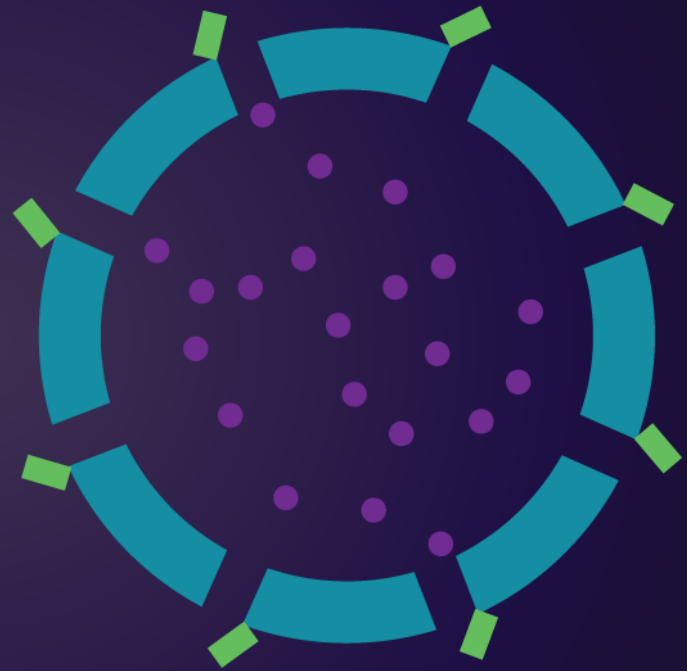
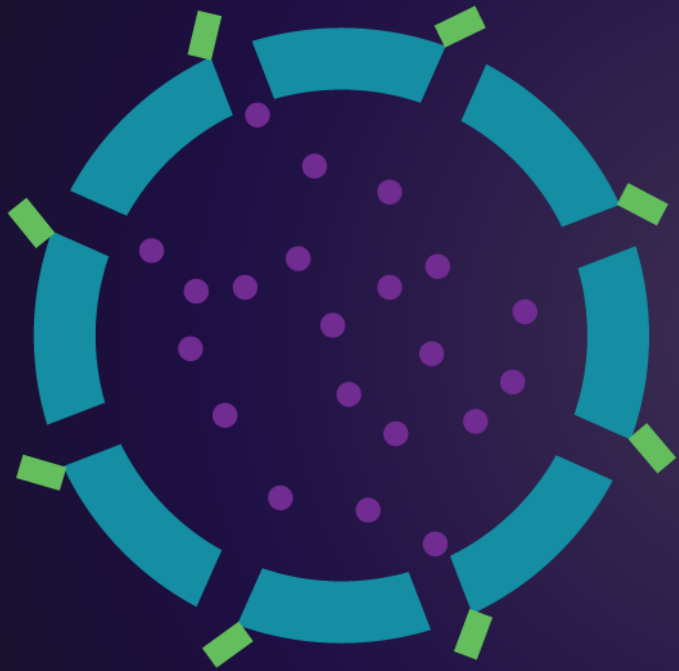
Target present















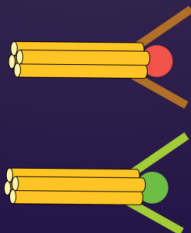
Stable

Mesoporous Silica
Nanoparticle



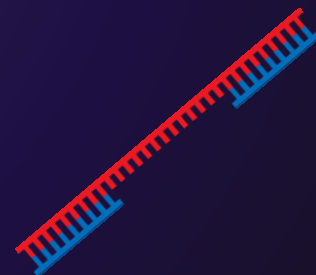
Reliable &
Easy

Signalling
Molecules

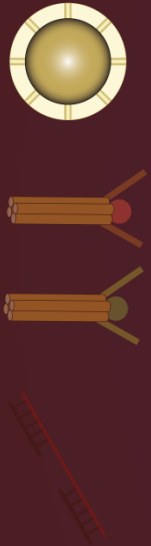


Robust &
Programmable

Gating
Modules

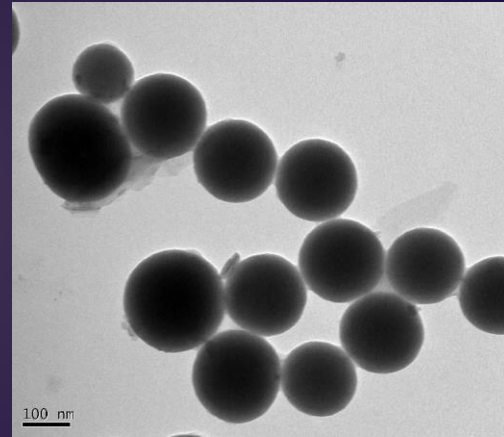


NANOPARTICLE CORE SiO_2



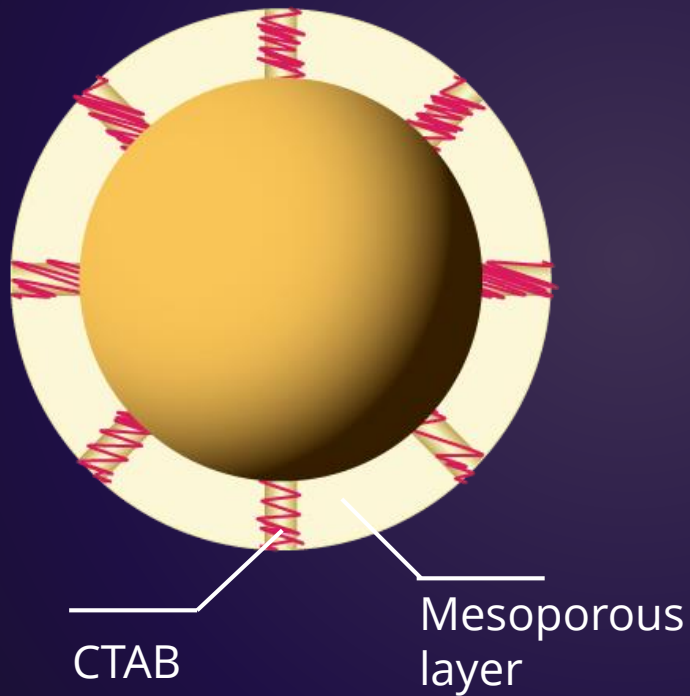
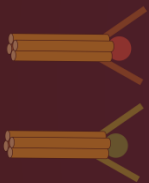
Stober's Process

TEM

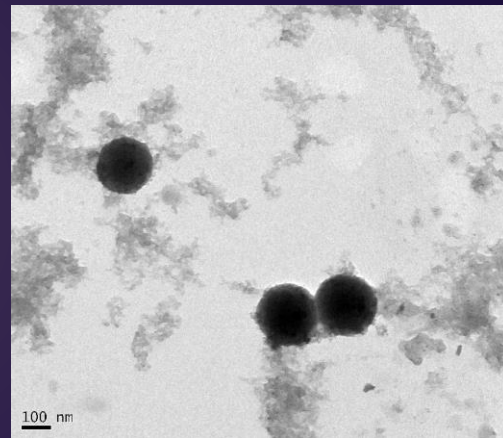


220nm particles synthesized

MESOPOROUS LAYER FORMATION

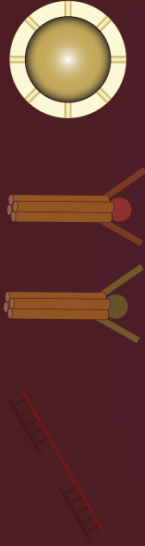
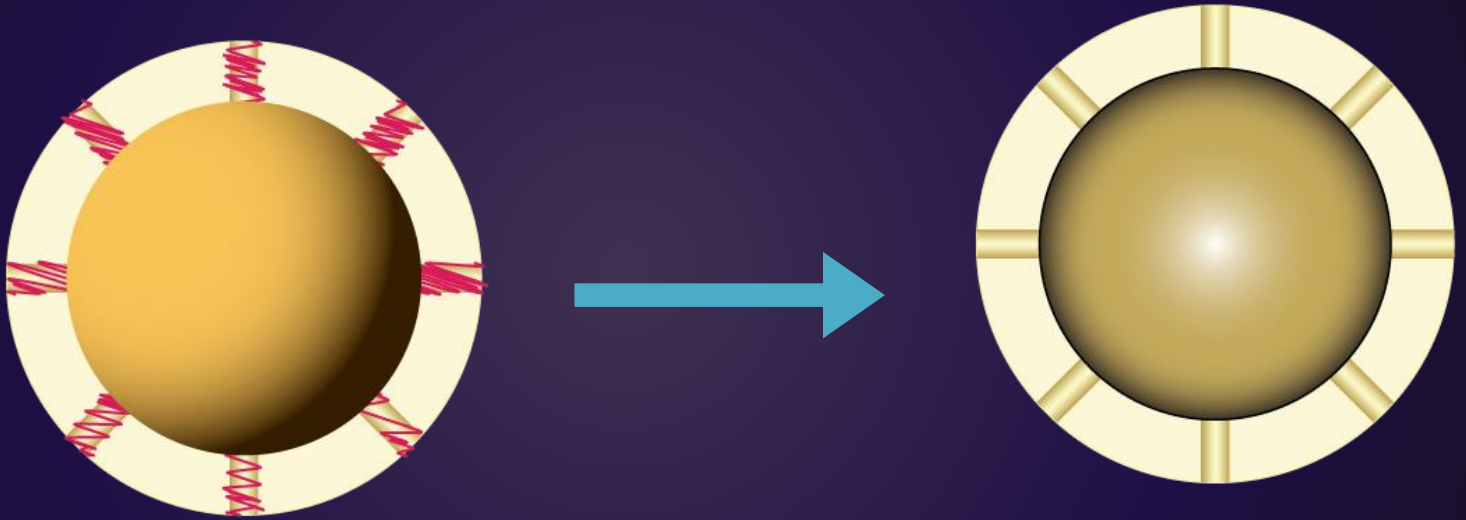


TEM



200nm particles synthesized

ETCHING



HMSN FORMATION: STAGES



Solid silica nanoparticle



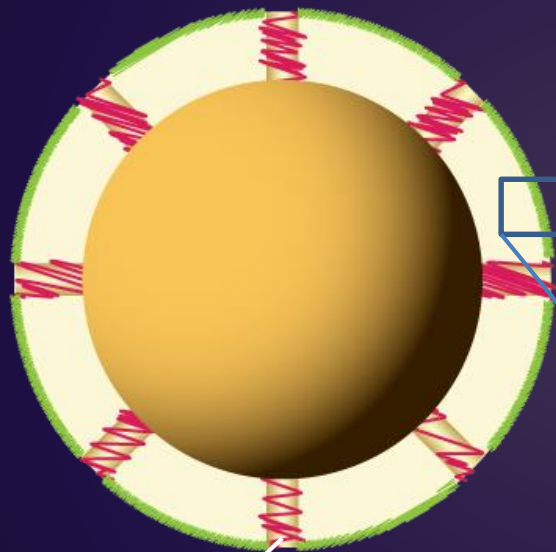
Mesoporous Layer
Formation (MSN)



Etching process

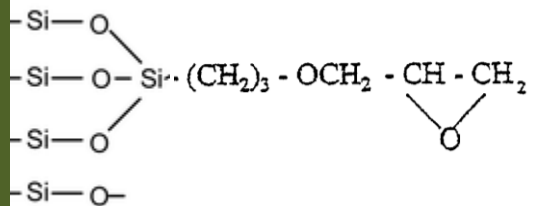


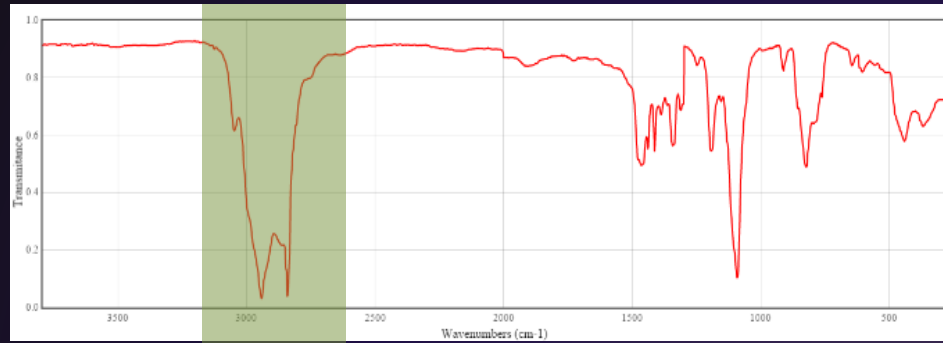
SURFACE BLOCKING



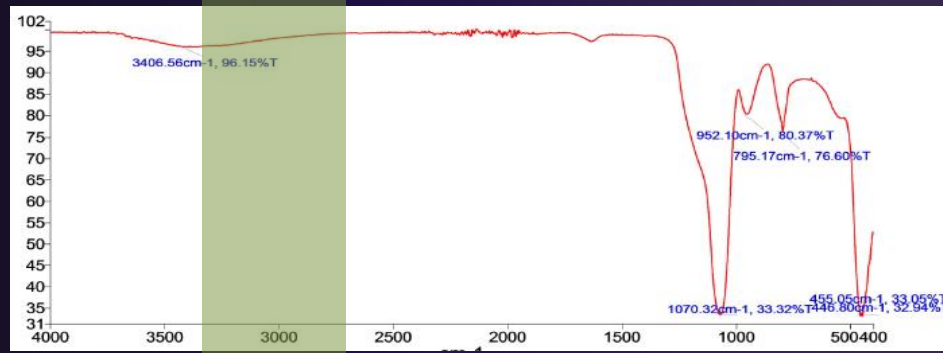
CTAB

GOPS = 3-Glycidyloxypropyltrimethoxysilane

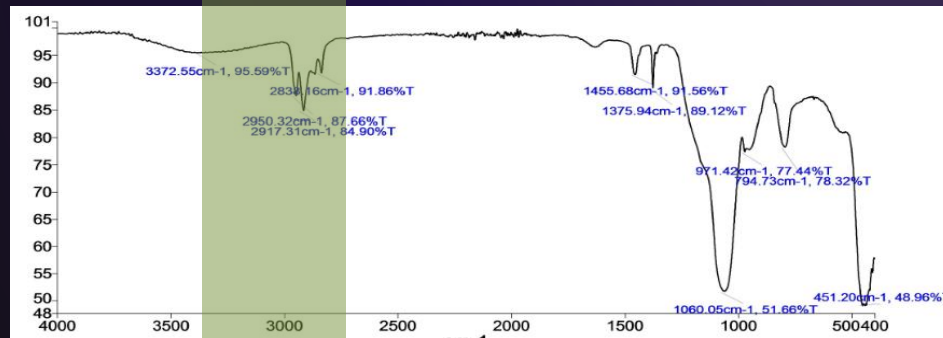




GOPS - characteristic IR Fingerprint
(Positive Control)

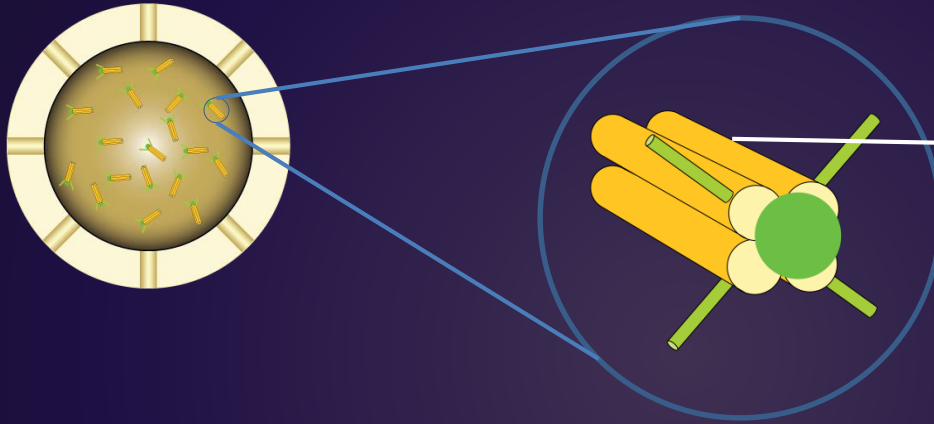


FTIR of Unblocked



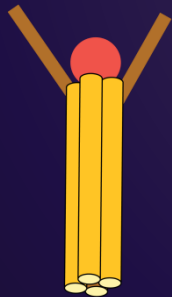
FTIR of GOPS blocked Sample (Test)

SIGNALING MOLECULES

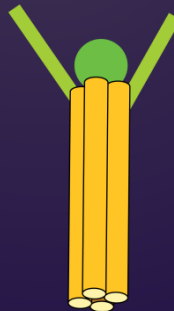


DNA Origami

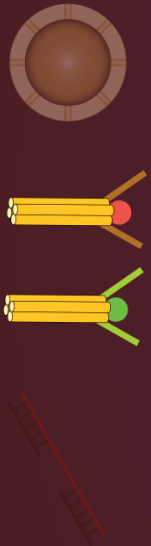
4 DNA Helices
&
a fluorophore



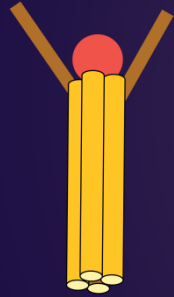
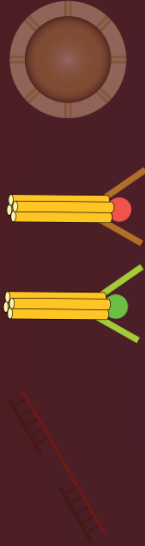
Rhodamine



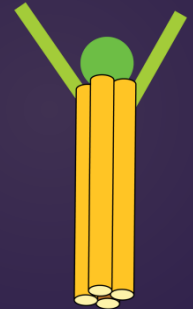
Fluorescein



SIGNALING MOLECULES



Rhodamine

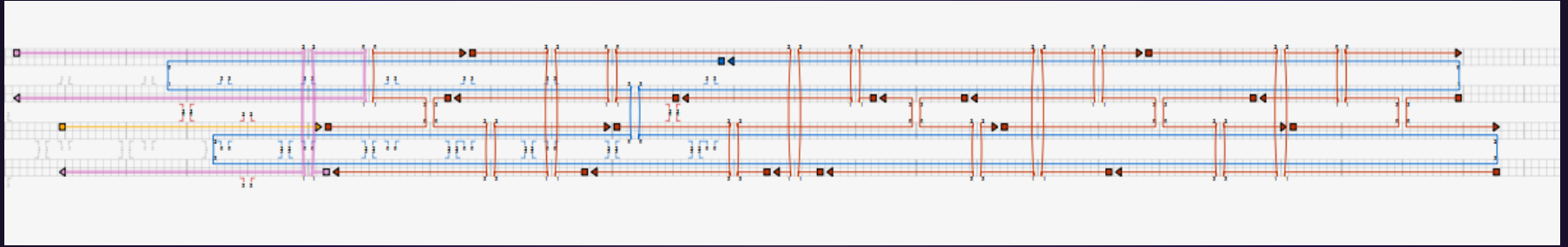


Fluorescein

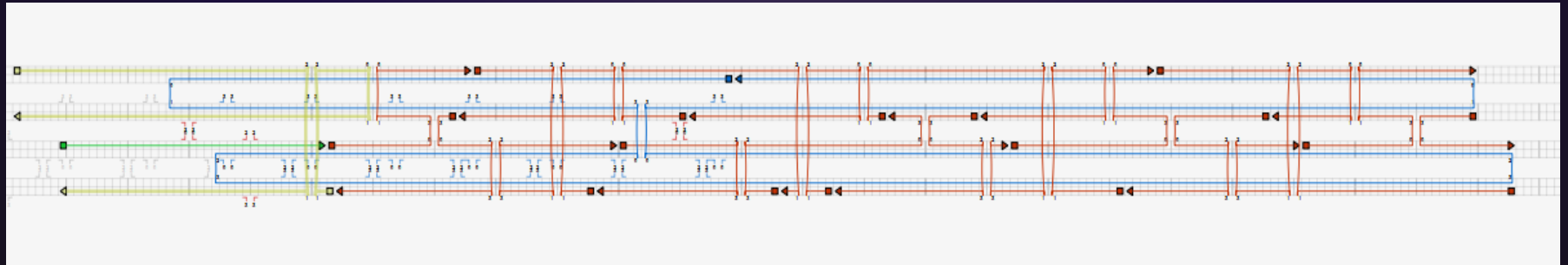
Flourescent
Resonant
Energy
Transfer

CADNANO DESIGNS

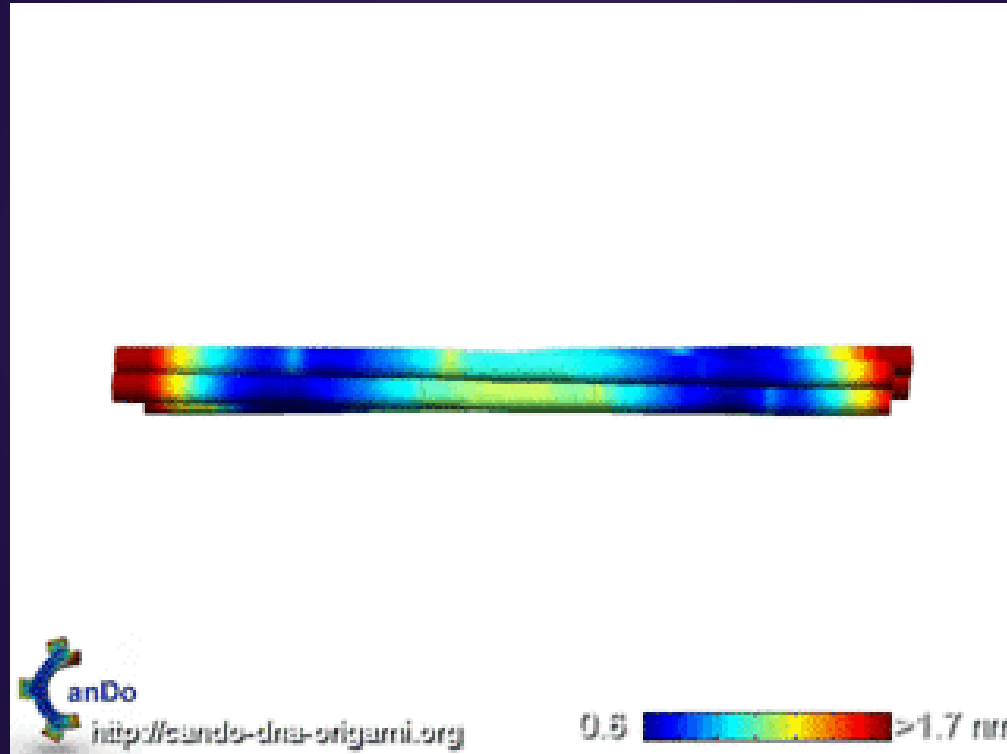
Rhodamine tagged Origami



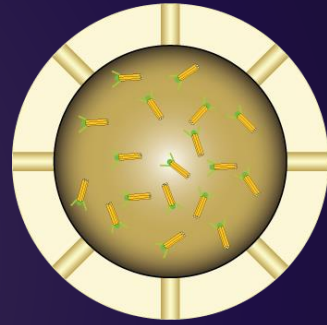
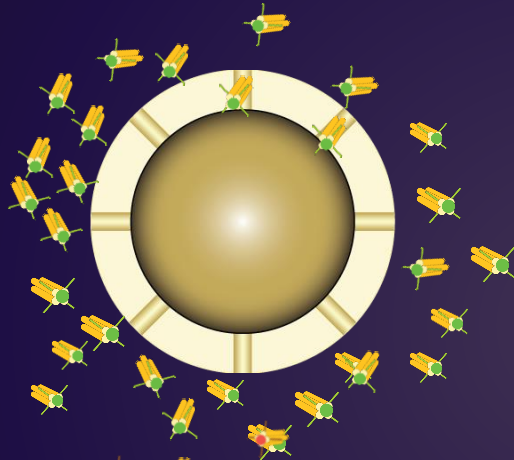
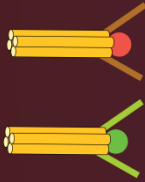
Fluorescein tagged origami



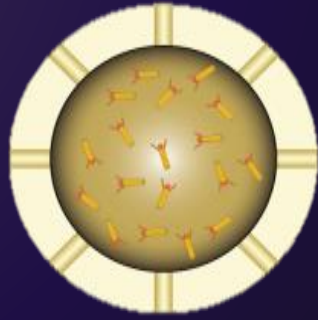
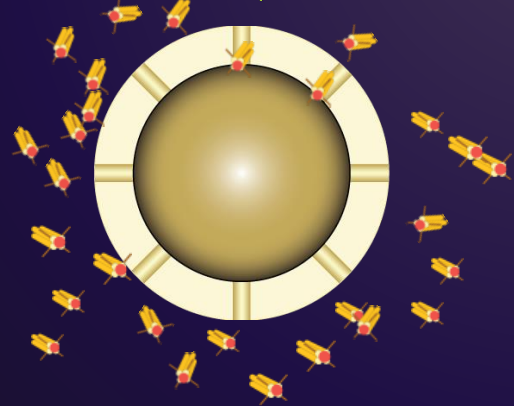
CANDO SIMULATION



SIGNALING MOLECULES: DIFFUSION

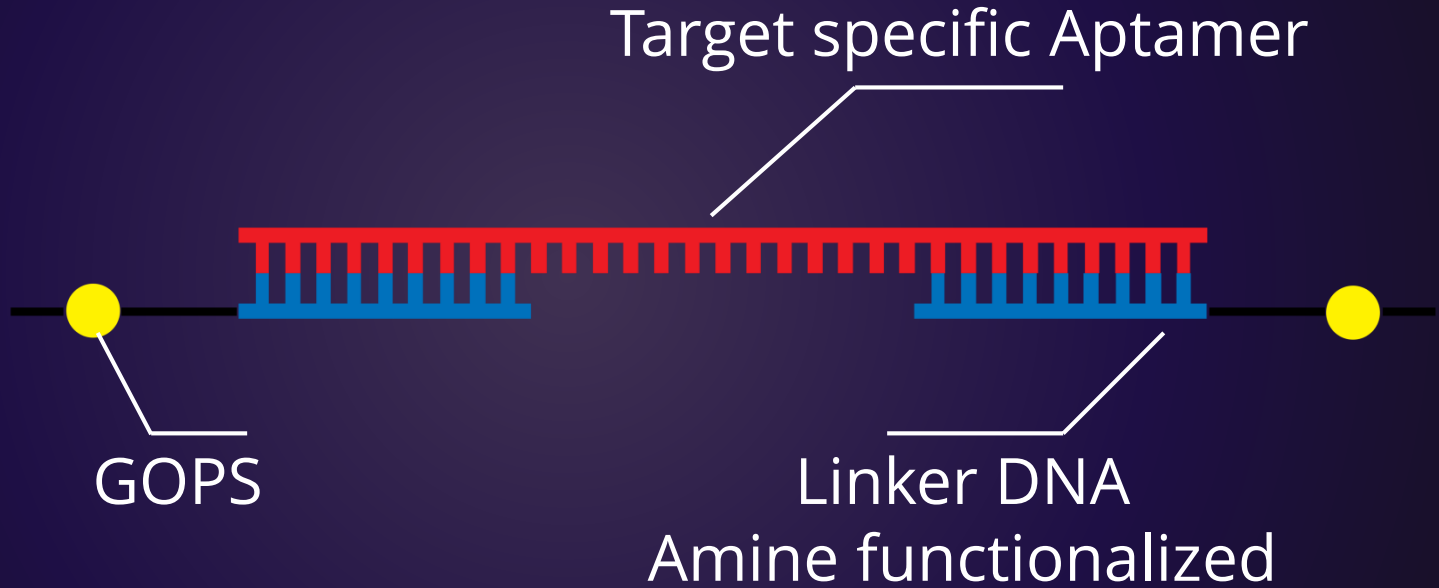


I

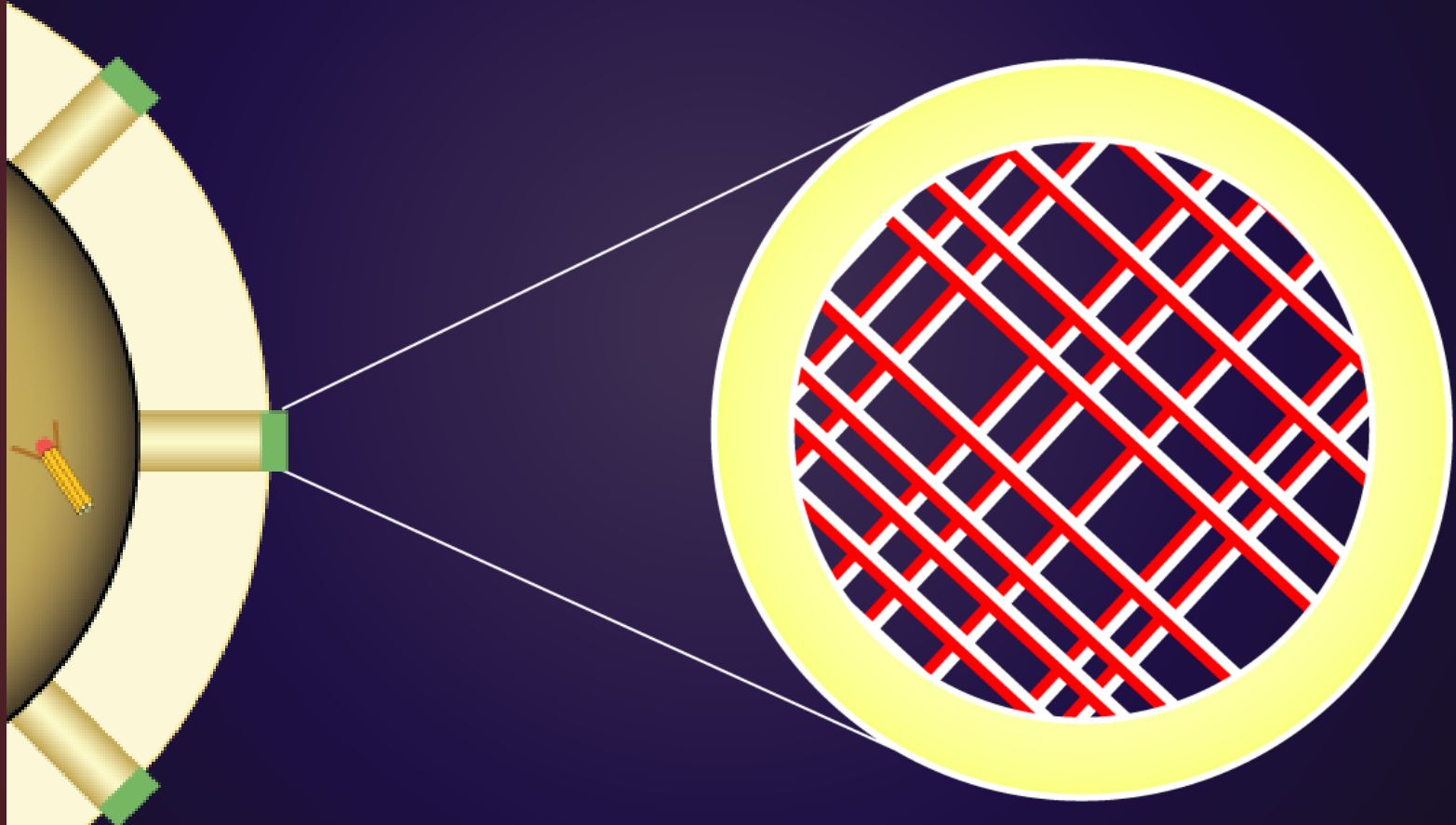
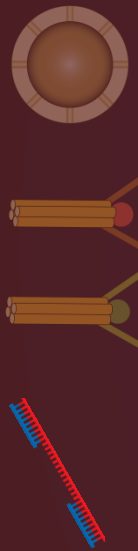


II

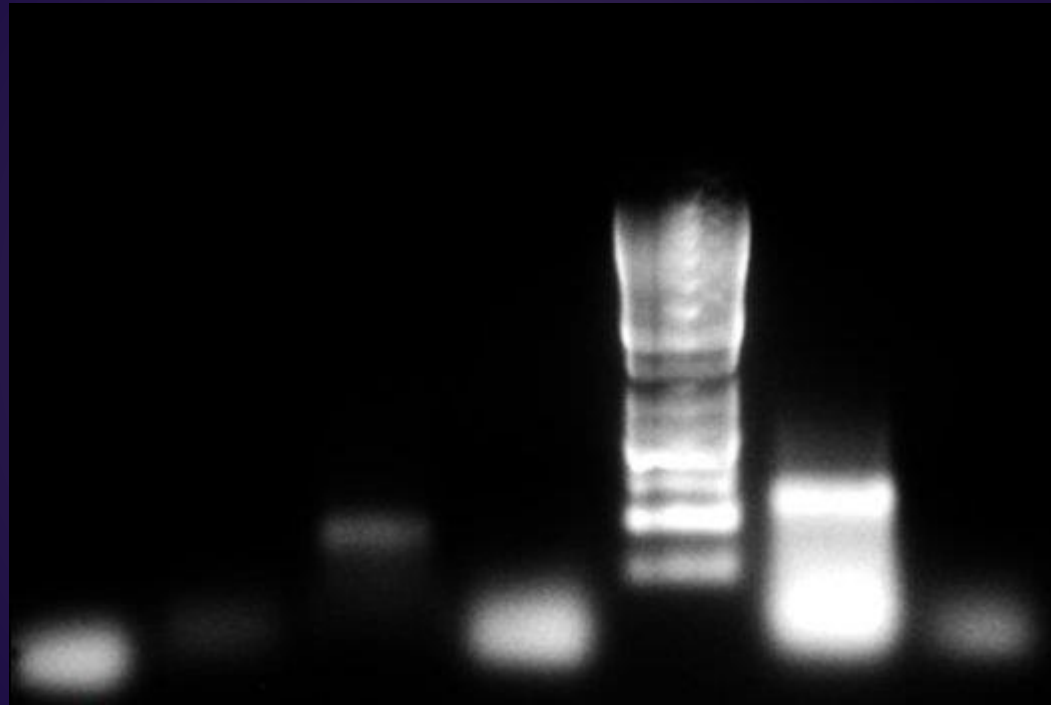
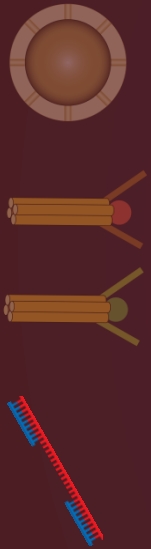
GATING MODULE



GATING MODULE: ATTACHMENT



FUNCTIONING OF GATING MODULE



L1

L2

L3

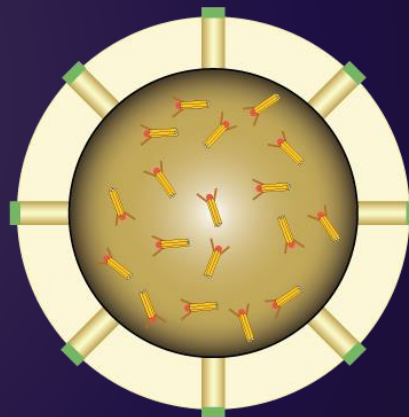
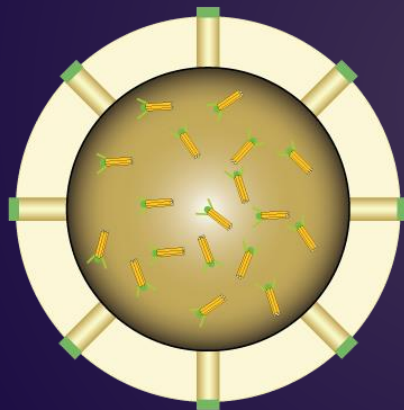
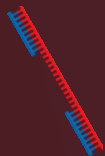
L4

L5

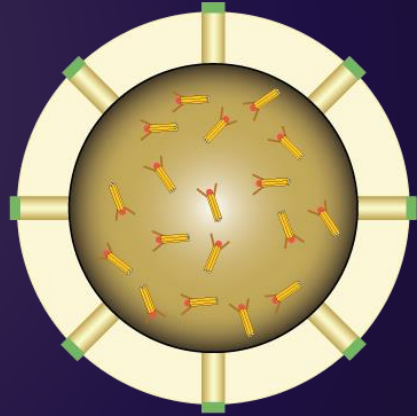
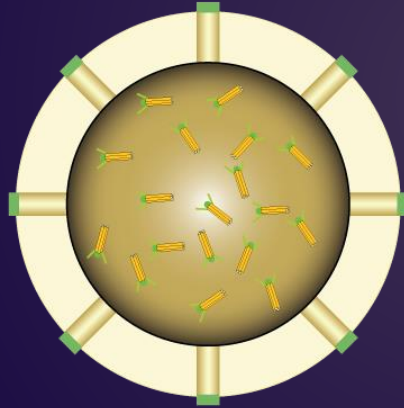
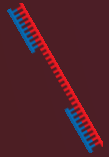
L6

L7

SENSORS IN SAMPLE SOLUTION

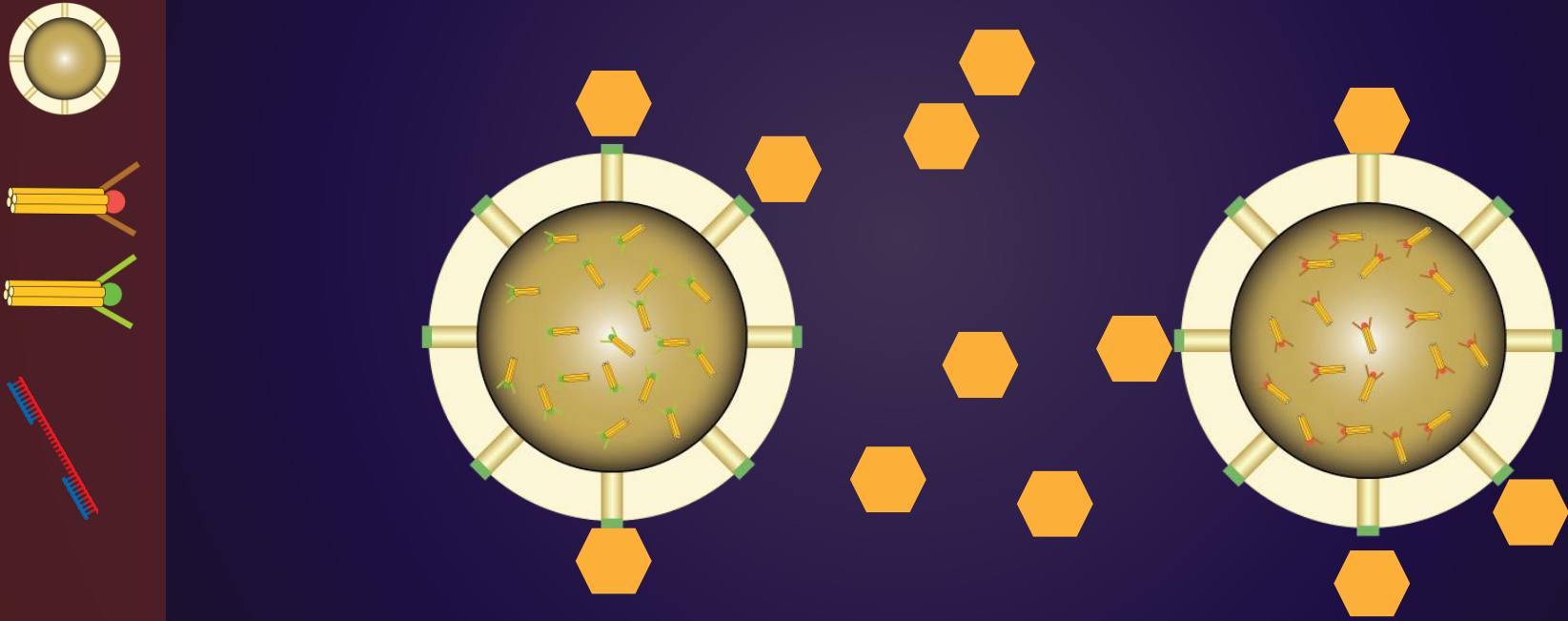


TARGET ABSENT

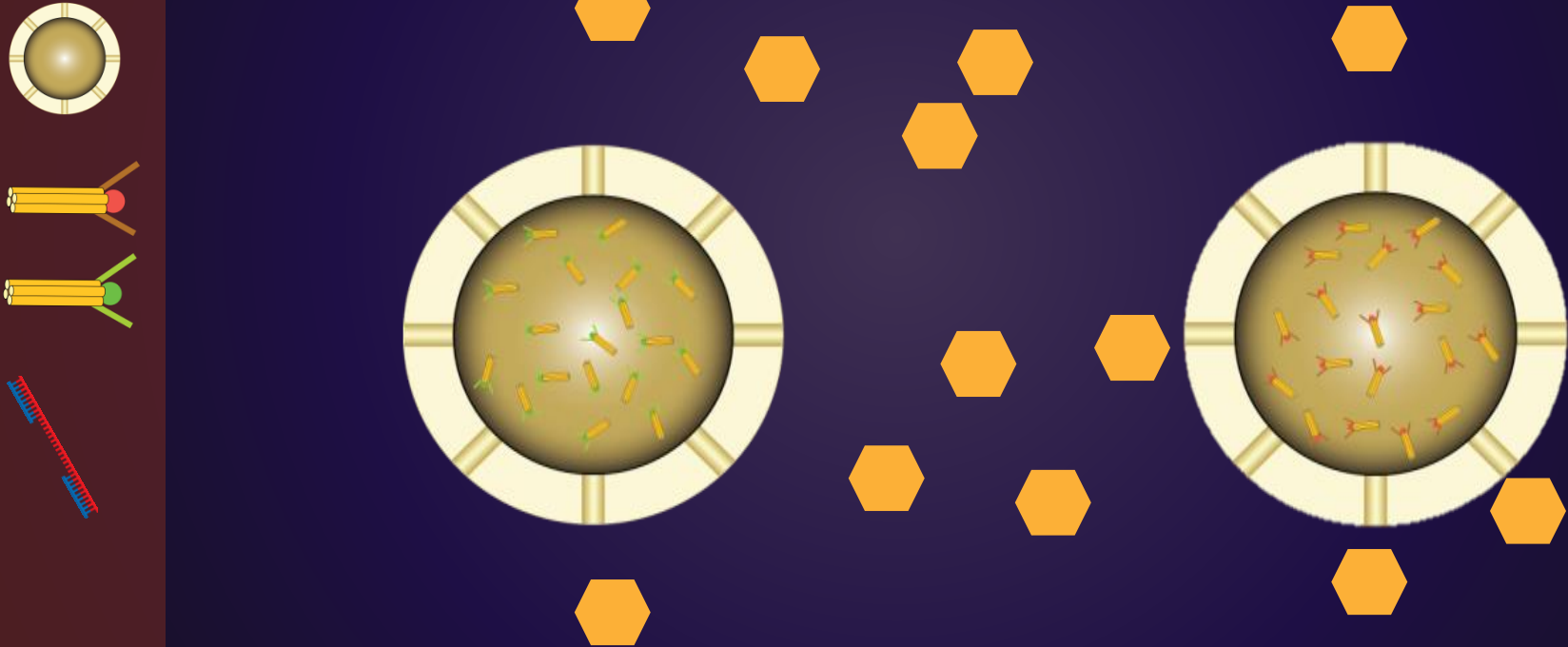


We detect emission in both
Cy3 and Cy5 channels

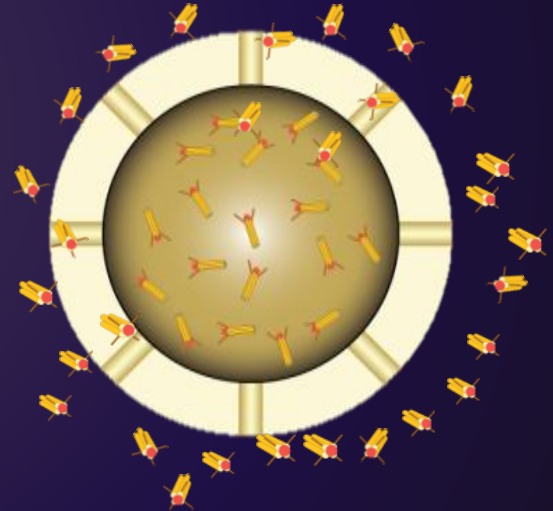
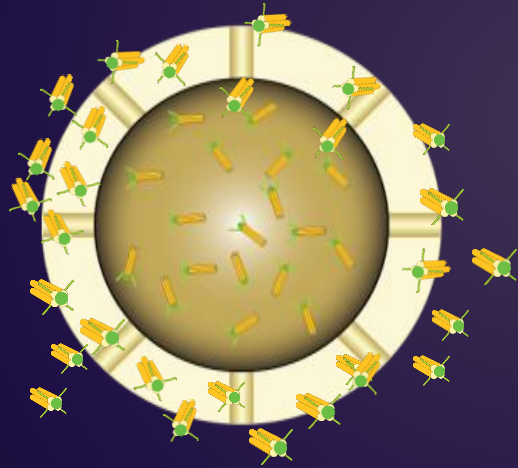
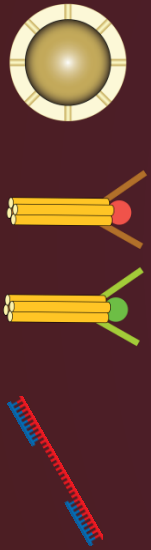
TARGET PRESENT



GATES OPENED BY TARGET



SIGNALLING MOLECULES DIFFUSE OUT

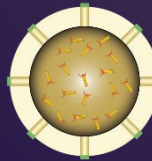
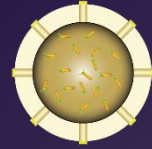


We detect emission only
In Cy5 channel

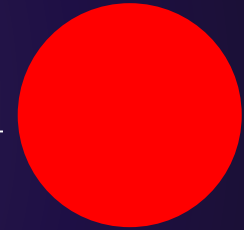
PROGRAMMABLE BIOSENSORS



Molecule A



Molecule B



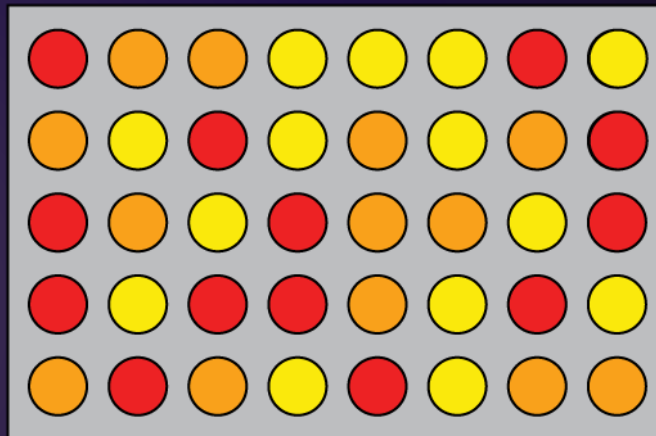
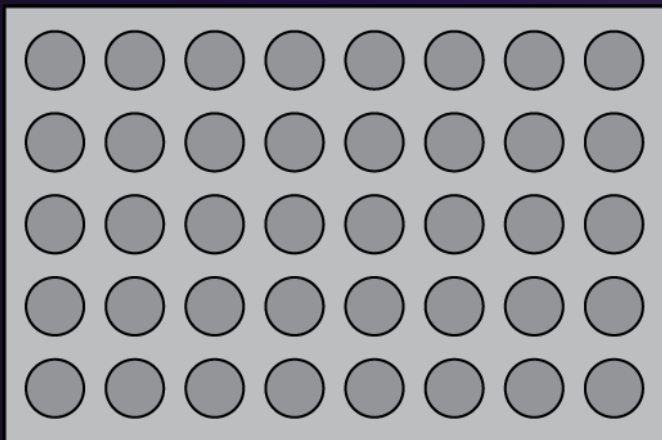
AND based Biosensor

A	B	Output
0	0	Yellow
0	1	Yellow
1	0	Yellow
1	1	Red

A background image of a microarray with a grid of small, glowing spots in various colors (yellow, green, red) on a dark surface.

HIGH THROUGHPUT BIOSENSING

HIGH THROUGHPUT SENSING



Arrayed biosensors.

Each cluster has a number of particles sensing for a given target

Post - FRET analysis

HIGH THROUGHPUT SENSING APPLICATION

Therapeutic Target Testing

Water Sample Screening



SPONSOR



Germinating Hope

Metahelix Life Sciences Limited
A TATA Enterprise



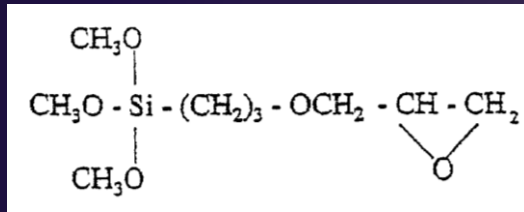
BITS Pilani

Pilani Campus

Department of Biological Sciences

A word cloud featuring the phrase "Thank You" in numerous languages and scripts. The words are arranged in a roughly rectangular shape, with "THANK YOU" being the largest and most prominent. Other visible words include "GRACIAS", "ARIGATO", "SHUKURIA", "JUSPAXAR", "DANKSCHEEN", "TASHAKKUR ATU", "YAQHANYELAY", "BIYAN SHUKRIA", "TINGKI", "SUKSAMA", "EKHMET", "MEHRBANI", "MAAKE", "KOMAPSUMNIDA", "LAH", "PALDIES", "BOLZIN", "MERCICI", "MERASTAWNY", "GOZAIMASHITA", "EFCHARISTO", "AGUYJE", "FAKAAJE", "CHILTU", "SPASSIBO", "SNACHALAHYA", "NORON", "MADEJA", "MAITEKA", "YUSPAGARATAM", "DUNIYADAD", "ANNA", "ATTO", "HES", "HESHI", "SPASIBO", "DENKAUJA", "MENACHALHYA", "UNACHHESH", "HAYUR", "EKONU", "SINOMO", "MAKETU", "MINMOHCHAR", "TAVYAPUCHI", "MEDAWAGGI", "KAKA", "SINGO", "GAEJTHO", "AGUYJE", "FAKAAJE", "LAH", "MAAKE", "KOMAPSUMNIDA", "LAH", "PALDIES", "BOLZIN", "MERCICI", "MINMOHCHAR", "HAYUR", "EKONU", "SINOMO", "MAKETU", "MINMOHCHAR".

Gating Module



+

NH₂-Oligonucleotide

