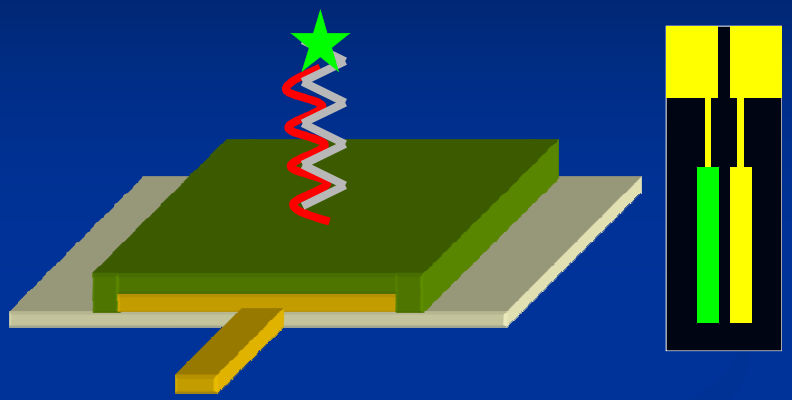
DNA conjugation and reversibility on chitosan surfaces

Rubloff Research Group Accomplishments

DNA conjugation and reversibility on chitosan surfaces

Accomplishment

- Single string DNA (ssDNA, probe) was conjugated to chitosan surface via glutaraldehyde activation
- Target ssDNA was hybridized to matching probe ssDNA via self-assembly
- Reversible DNA hybridization was achieved under urea denaturation and hybridization



Significance

- The chitosan-based DNA hybridization is simple to achieve spatially selective assembly
- The probe is sensitive and is applied to sandwich assay of total RNA sample
- The probe is robust and provides reproducible measurements with a high signal-to-noise ratioseven after repeated hybridization and denaturation cycles

People involved

Hyunmin Yi, Greg Payne, Bill Bentley, Gary Rubloff

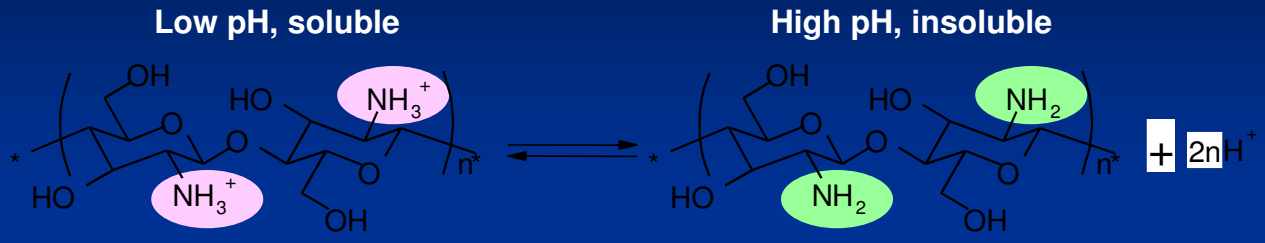
Collaborations with Li-Qun Wu, Reza Ghodssi,,

Links

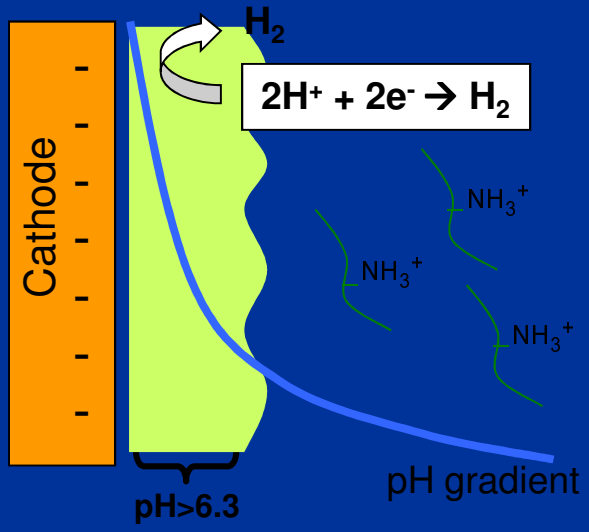
Hyunmin Yi et al, Anal. Chem. 76 (2), 365-372 (2004)

Chitosan Electrodeposition

Unusual polysaccharide

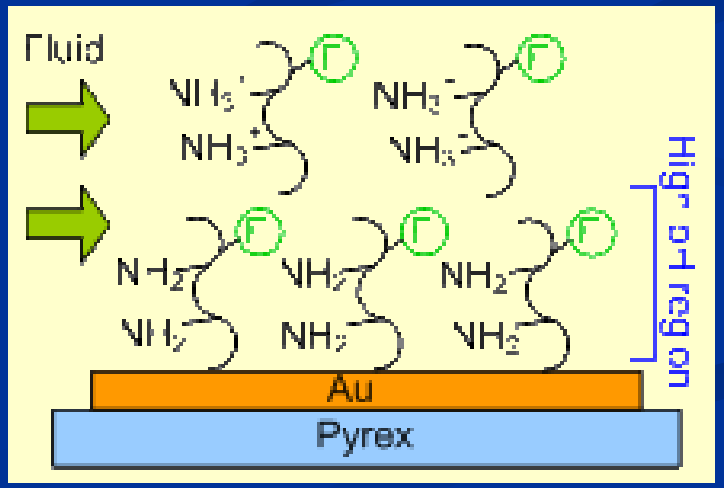


Chitosan electrodeposition

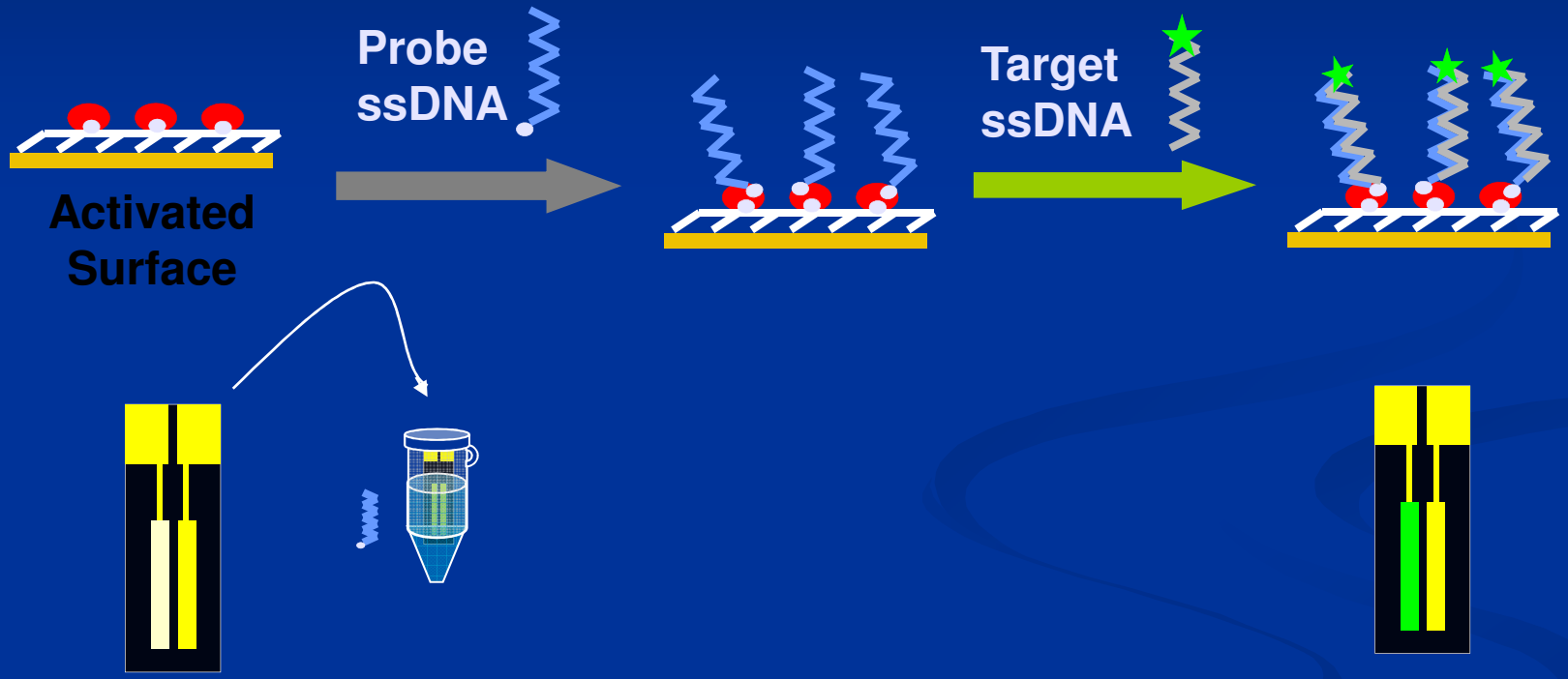


High pH region at negative electrode due to hydrogen evolution

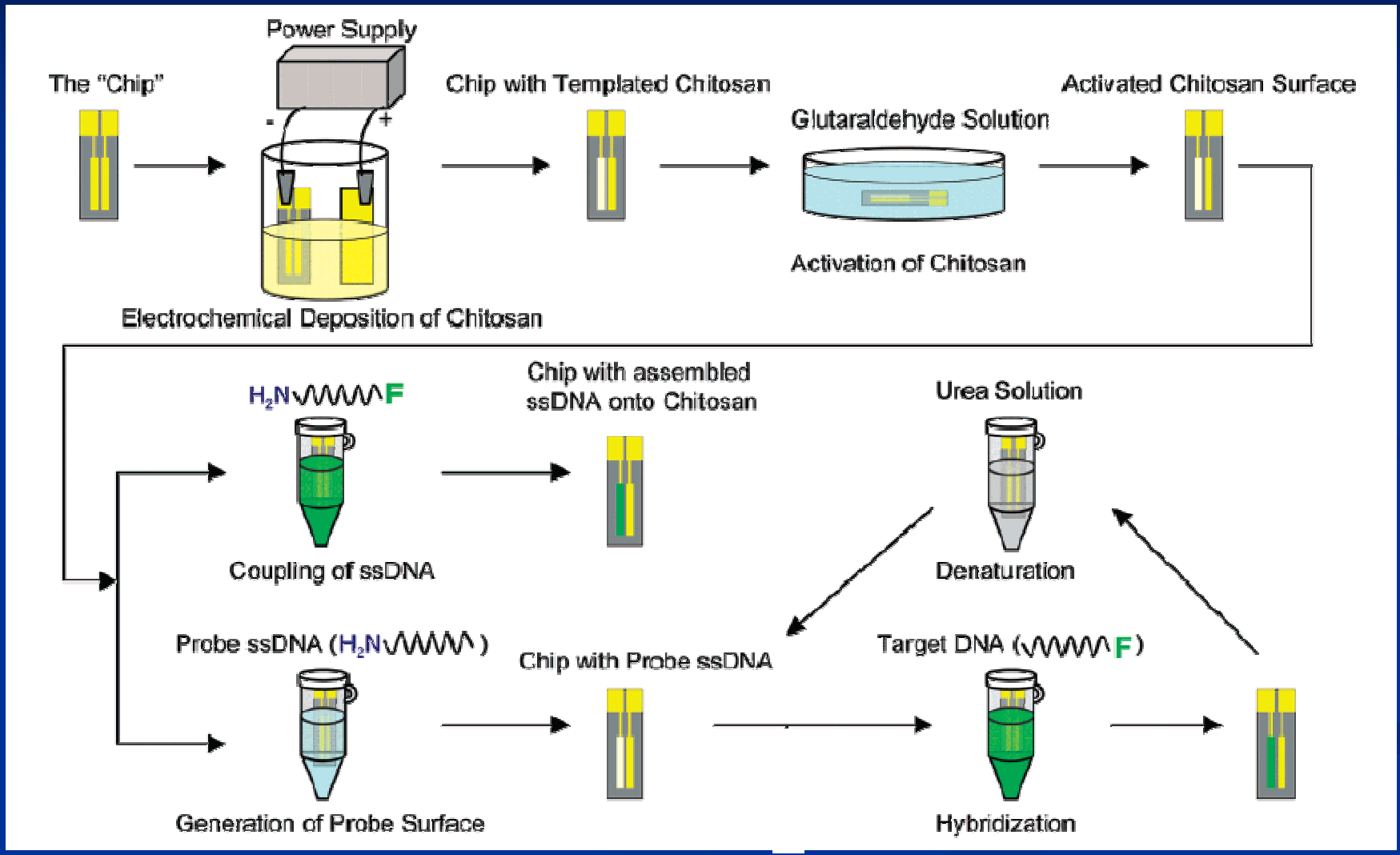
Chitosan molecules deprotonated, immobilized at electrode surface



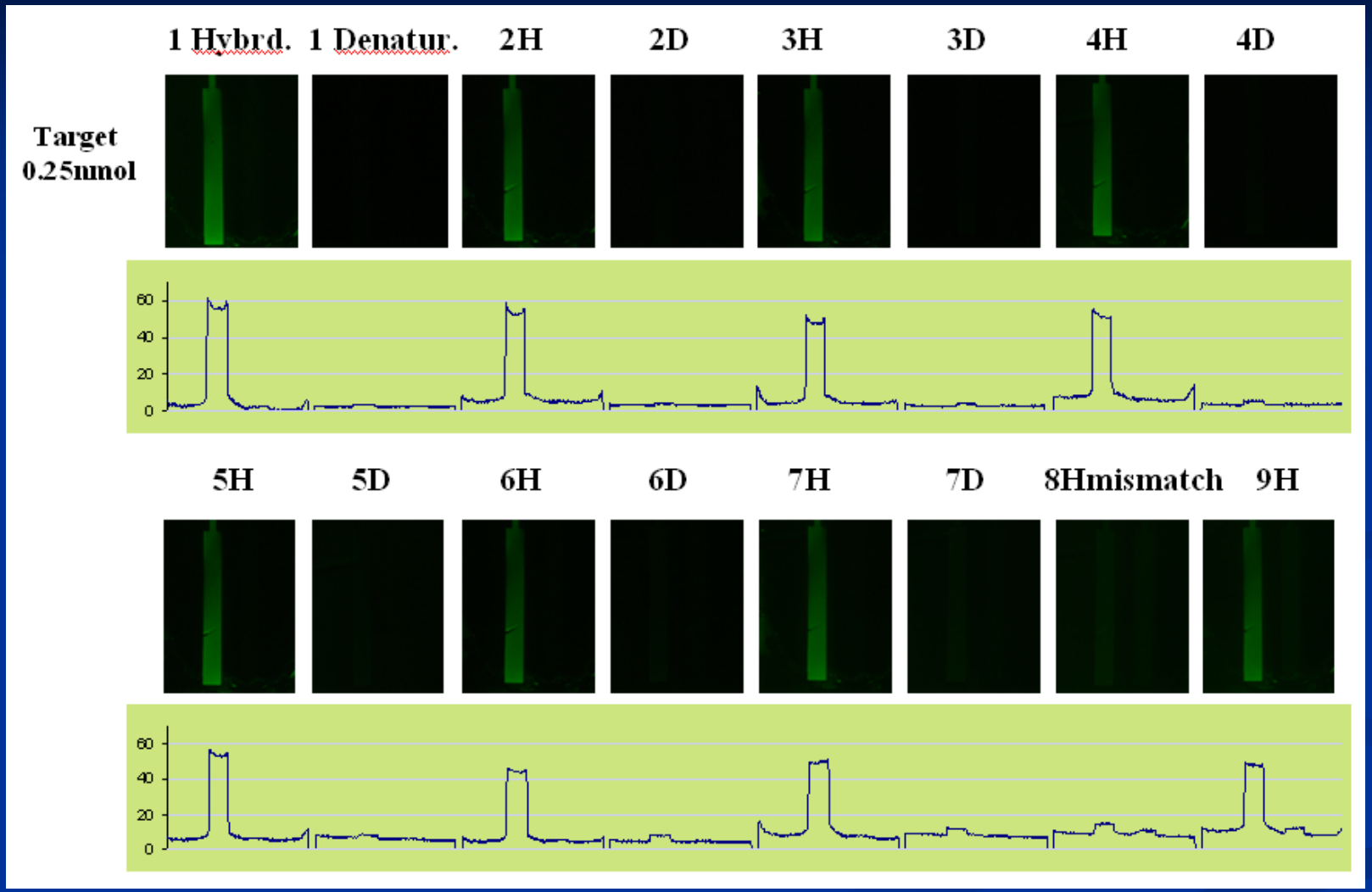
DNA Hybridization on Chitosan



Reversible DNA Hybridization on Chitosan

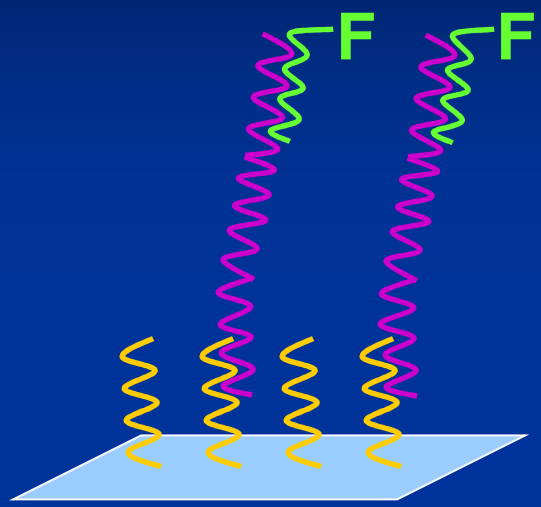


Reversible DNA Hybridization

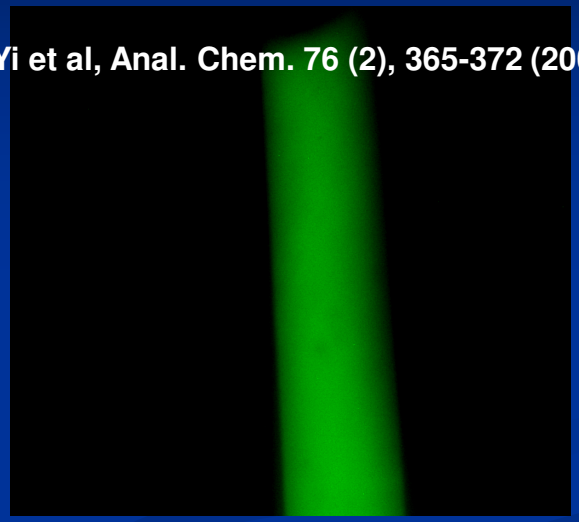


Yi et al, *Anal. Chem.* 76 (2), 365-372 (2004)

Analysis of Purified Total RNA from *Escherichia coli* culture by Sandwich Assay



Yi et al, Anal. Chem. 76 (2), 365-372 (2004)



ssDNA (sandwich probe) → Hybridization → mRNA (analyte) → Hybridization

Electrode ← Chitosan ← **Glutaraldehyde** ← **ssDNA (probe)**

Virus Assembly on Chitosan

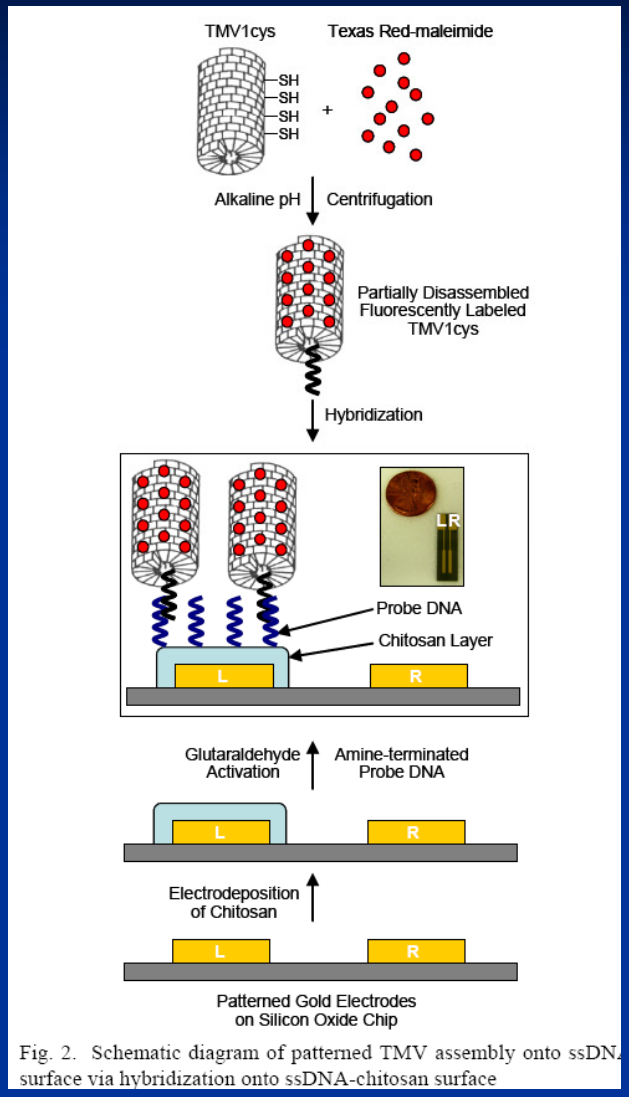
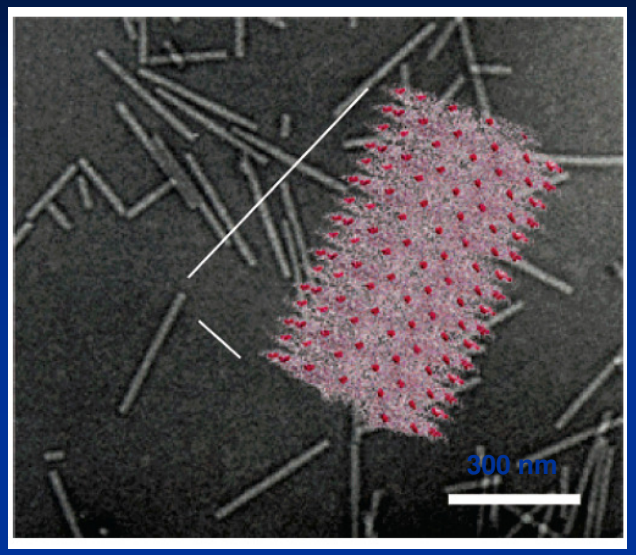
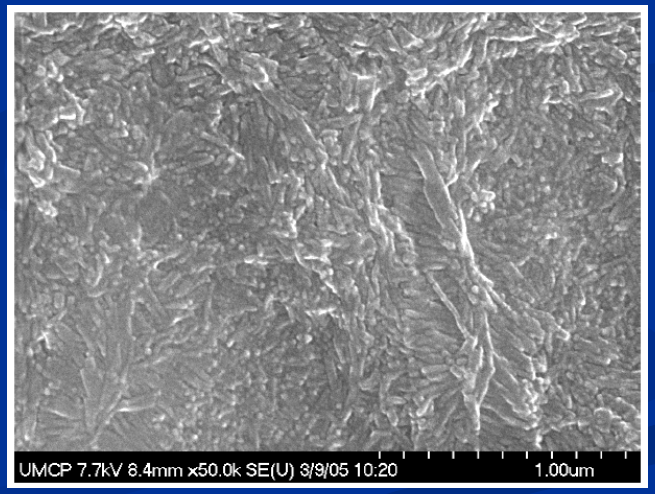


Fig. 2. Schematic diagram of patterned TMV assembly onto ssDN
surface via hybridization onto ssDNA-chitosan surface





Yi et al, *Nano Lett* 5 (10) 1931-1936 (2005)