Screening for DNA Aptamers that Bind to GaN

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Using Aptamers to Assemble Useful Devices

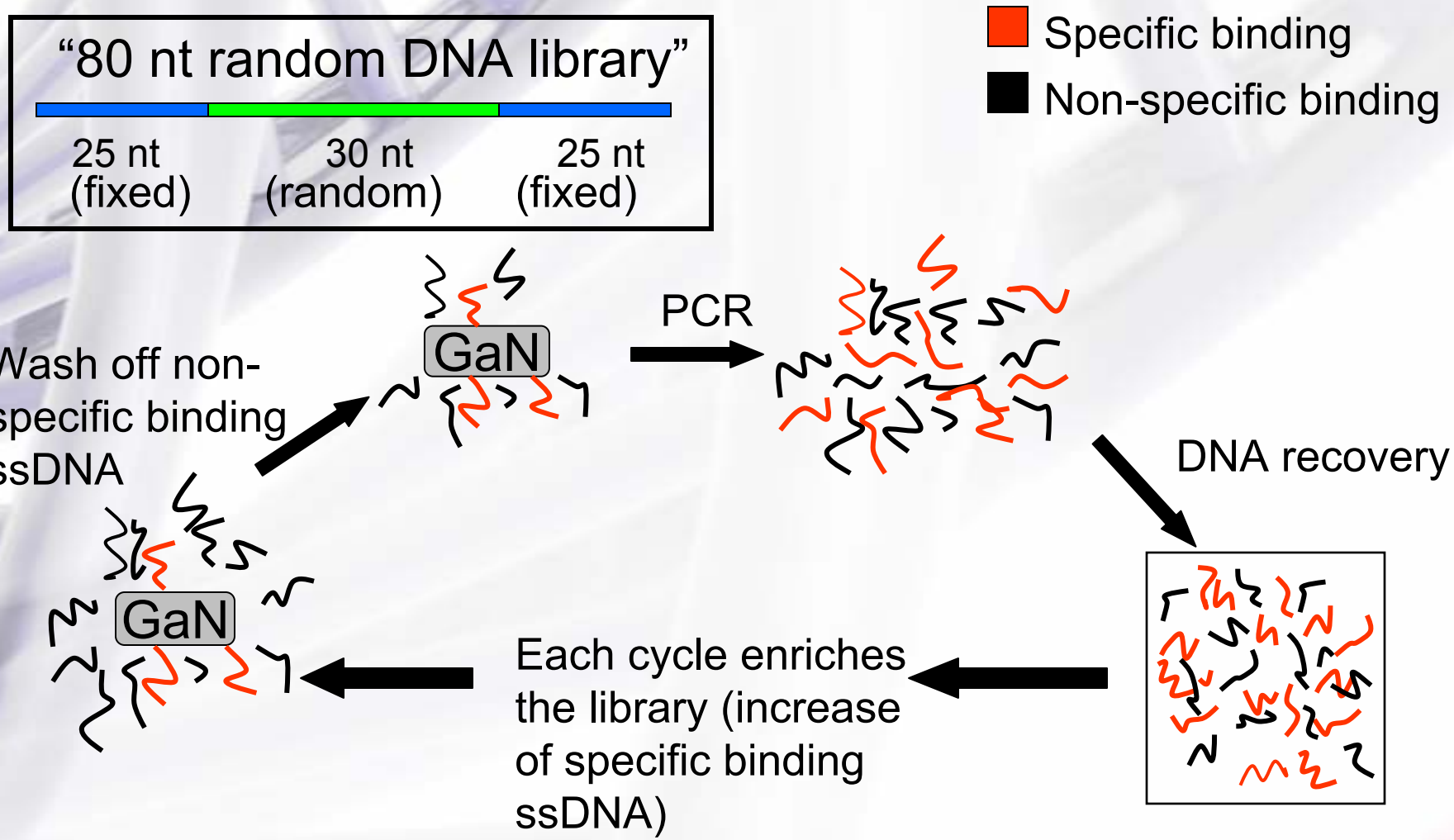
- Current state of nanotechnology: Synthesis of nanostructures (ex:nanowires, nanotubes…)
- HOWEVER, lacking the tools to build useful devices from nanostructures
- Aptamer (comes from Latin word *aptus* meaning ‘fitting’): ssDNA or RNA molecules that bind to specific targets
- **Using biotechnology to control the specificity of biomolecular interactions**.

ssDNA

(http://www.science.mcmaster.ca/biochem/faculty/li/ResearchPics/Razvan/Structure-Switching2.jpg)

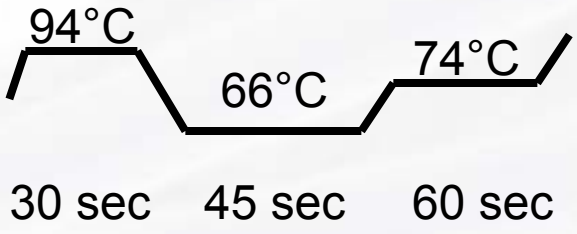
Research Objectives & Approach

- My Objective: Select for DNA sequences that bind to GaN using PCR and DNA recovery



Polymerase Chain Reaction (PCR)

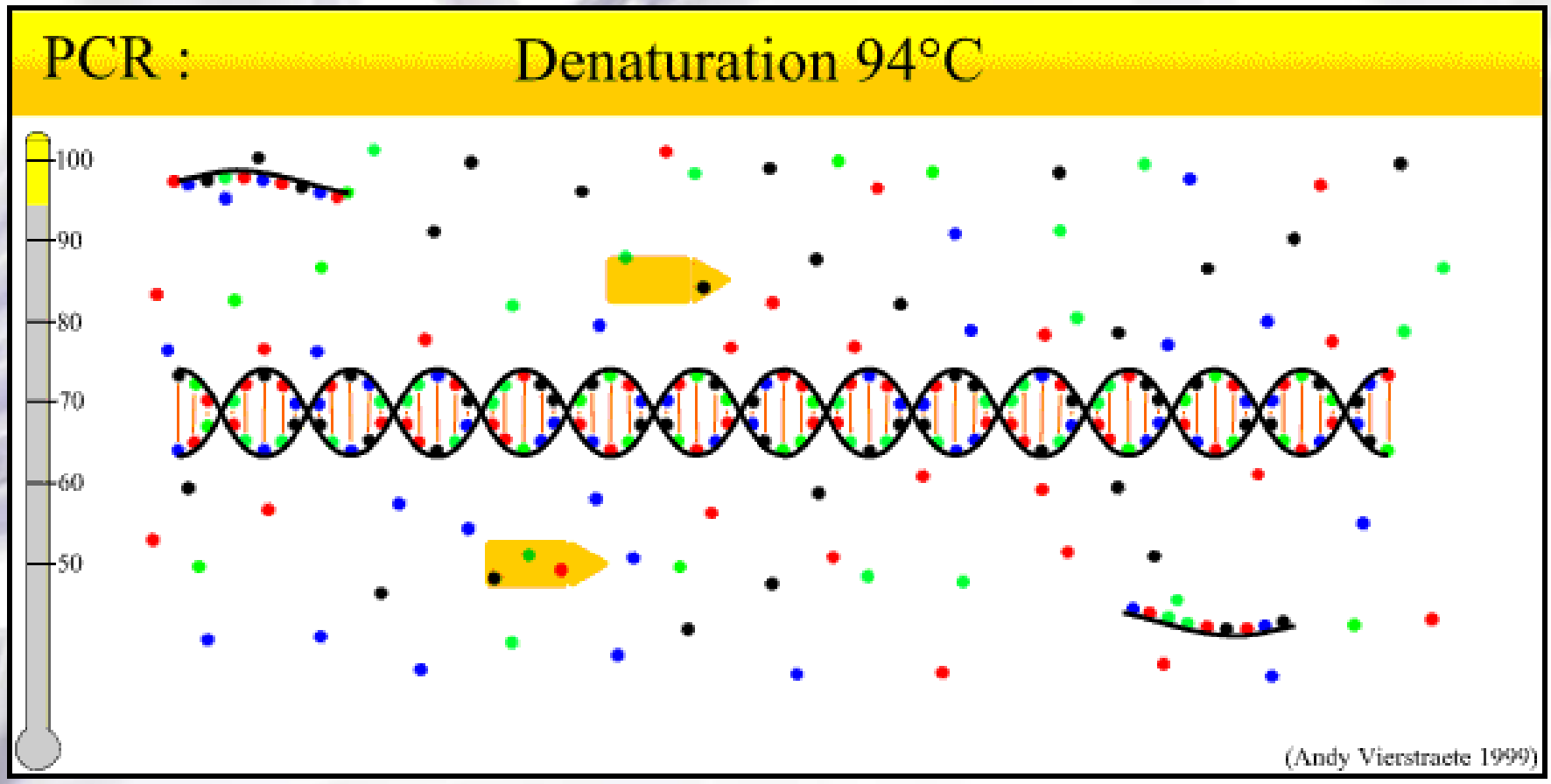
- The Starting Materials:
  1. DNA polymerase (enzymes that replicate DNA)
  2. Primers (used to initiate DNA replication)
  3. Nucleotides (monomers of DNA, building blocks)
  4. Targeted DNA sequence (the template)
- Equipment: Thermal cycler →



30X

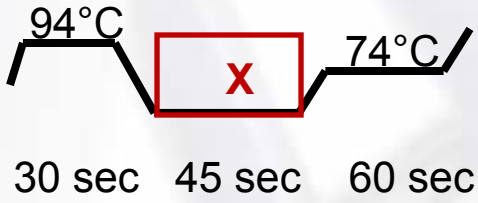
Temperature program in each cycle

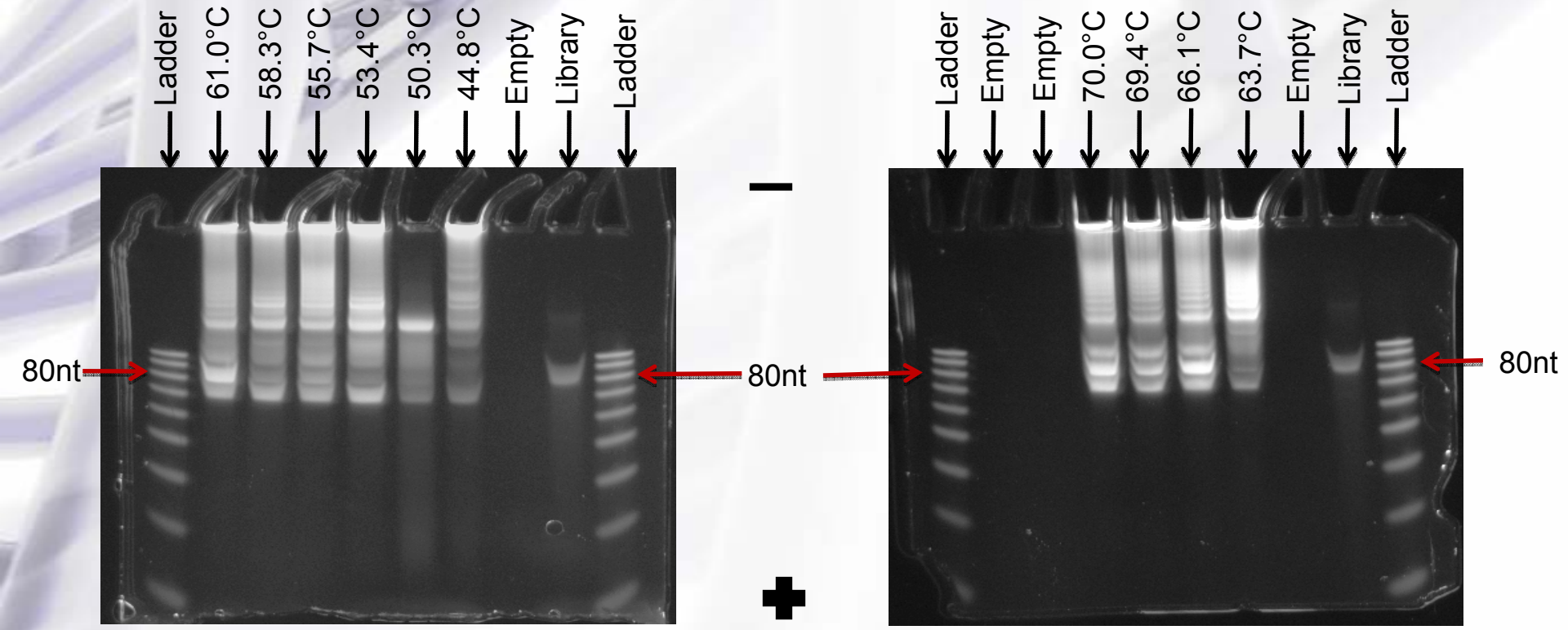
DNA replication trough PCR



Optimizing Annealing Temperature

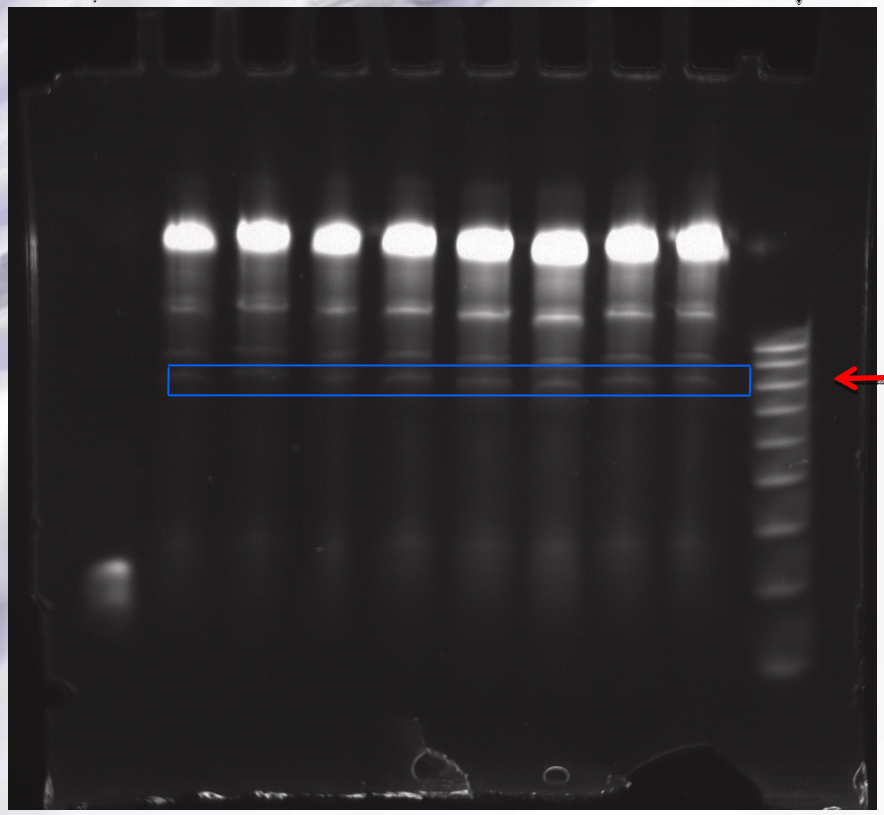
PCR Template = unscreened library DNA

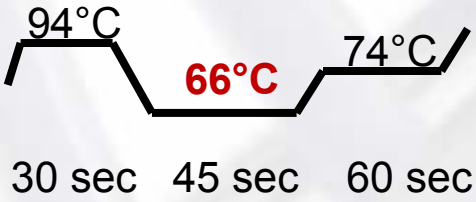


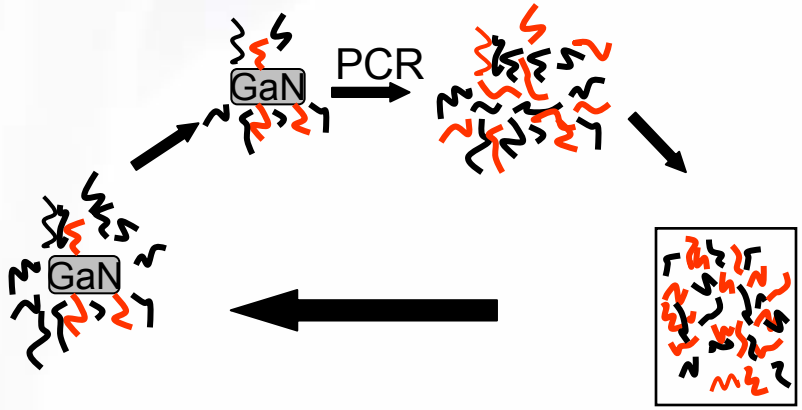


10% Polyacrylimide (PAGE-UREA)

DNA Recovery







PCR Template = screened library DNA

Accomplishments
(What I have Learned)

- Hands-on experience with some biology experimental techniques (PCR, electrophoresis)
- Understanding my project and the inportance of aptamers
- Getting exposed to using research equipment
- Learning about grad-school, and research in general
- Learned some valuable organization skills

Future Plans

What still remains to be done?

- Screen for aptamers that bind to other targets

- Use DNA aptamers as assembly tools to build useful devices

- Explore the possibility of us make nanostructures

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Questions