GENESIS:

Genetic Exploration through Nanopore Enhanced Sequencing with Integrated Photonic Systems

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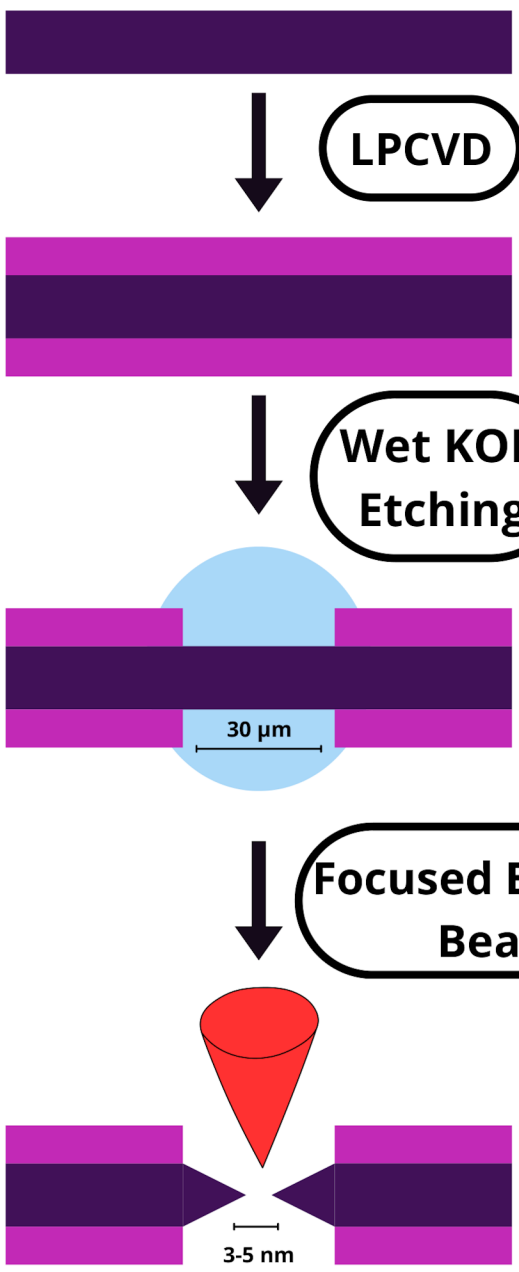
INTRODUCTION

In genomics, **nanopore sequencing** is revolutionary, but using **biological pores** like alpha-hemolysin has limitations. **Size constraints** affect **speed** and **resolution**, and reliance on **ionic currents** introduces potential **errors** by making it **susceptible to noise.**

Could solid-state nanopores and optical sensing offer solutions for advancing genomic research?

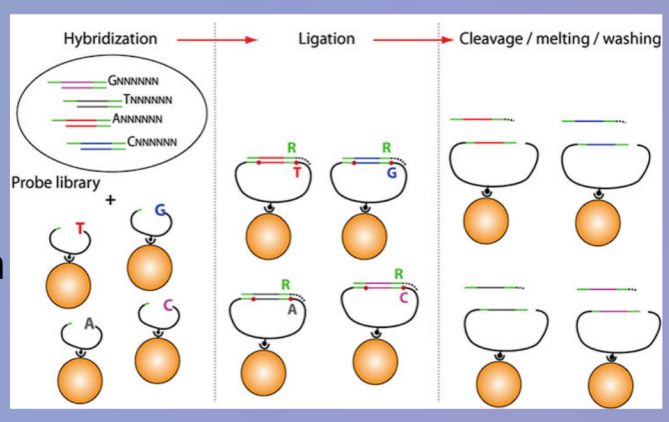
NANOPORE FABRICATION



SEQUENCING PRINCIPLE

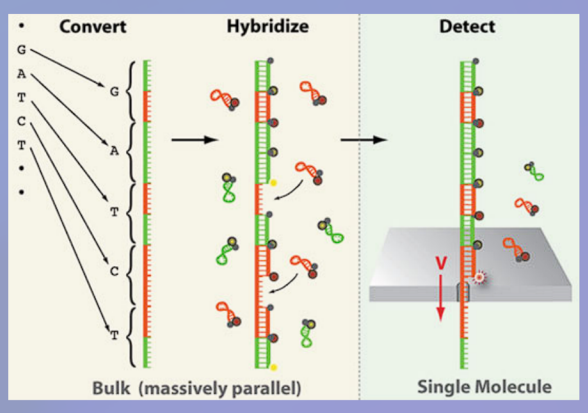
DNA Sample Preparation

- CDC: Circular DNA Conversion
- Fluorophores



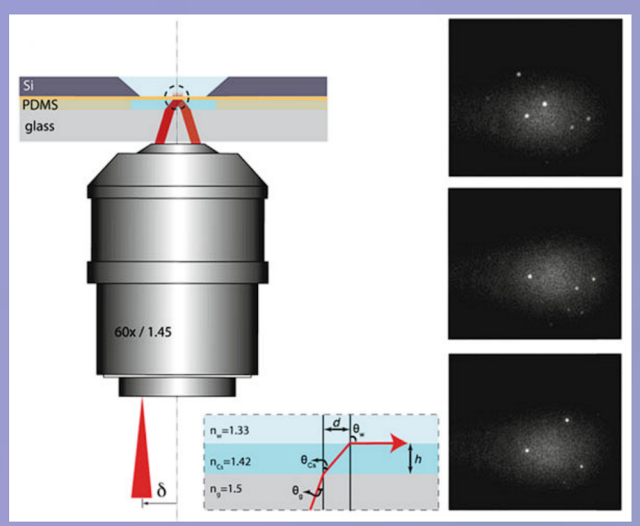
Translocation

- Voltage dependent
- Physical unquenching



Optical Sensing

- TIR: Total Internal Reflection
- EM-CCD camera



CONCLUSIONS

Solid nanopores and **optical sensing** in DNA sequencing promise to revolutionize genomics and personalized medicine by **eliminating amplification**, providing **high resolution**, enabling **high-speed** processing, and facilitating **parallel signal detection**, leading to enhanced efficiency and deeper insights into the genetic code for improved healthcare applications.

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