

9-20-2002

## An approach to sequence DNA without tagging

Sanjun Niu

*Department of Chemical Engineering, University of Nebraska-Lincoln, sniu2@unl.edu*

Ravi F. Saraf

*University of Nebraska-Lincoln, rsaraf2@unl.edu*

Follow this and additional works at: [https://digitalcommons.unl.edu/chemeng\\_biotechnology](https://digitalcommons.unl.edu/chemeng_biotechnology)



Part of the [Biochemical and Biomolecular Engineering Commons](#)

---

Niu, Sanjun and Saraf, Ravi F., "An approach to sequence DNA without tagging" (2002). *Papers in Biotechnology*. 15.  
[https://digitalcommons.unl.edu/chemeng\\_biotechnology/15](https://digitalcommons.unl.edu/chemeng_biotechnology/15)

This Article is brought to you for free and open access by the Chemical and Biomolecular Engineering Research and Publications at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Papers in Biotechnology by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

*Chemical Engineering Research and Publications*  
*Chemical Engineering Papers: Biotechnology*

---

*University of Nebraska - Lincoln*

*Year 2002*

---

An approach to sequence DNA without  
tagging

Sanjun Niu\*

Ravi Saraf†

\*Department of Chemical Engineering, University of Nebraska-Lincoln, sniu2@unl.edu

†Department of Chemical Engineering, University of Nebraska-Lincoln, rsaraf@unl.edu

This paper is posted at DigitalCommons@University of Nebraska - Lincoln.

[http://digitalcommons.unl.edu/chemeng\\_biotechnology/15](http://digitalcommons.unl.edu/chemeng_biotechnology/15)

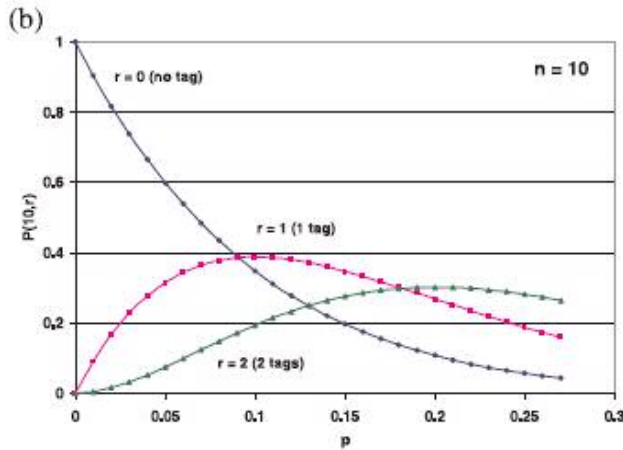
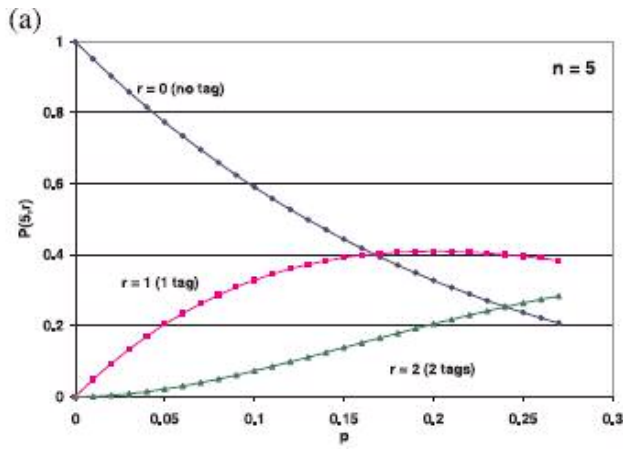


Figure 1. Number fraction of DNA synthesized in PCR with  $n$  nucleotides that may be tagged. As the  $p$  increases, the fraction of untagged nucleotide decreases monotonically. However, the number fraction for  $r > 0$  has a maximum.

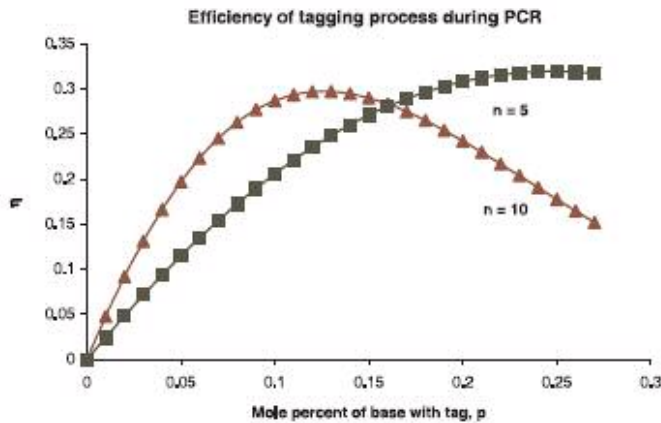


Figure 2. The  $\eta$  increases with  $p$  since more tagged bases are available for insertion. When the number of sites (i.e.  $n$ ) increases, the probability of DNA with multiple tags also increases. Thus  $\eta$  exhibits a maximum at  $n = 10$ . The maximum for  $n = 5$  occurs at a larger  $p$ .

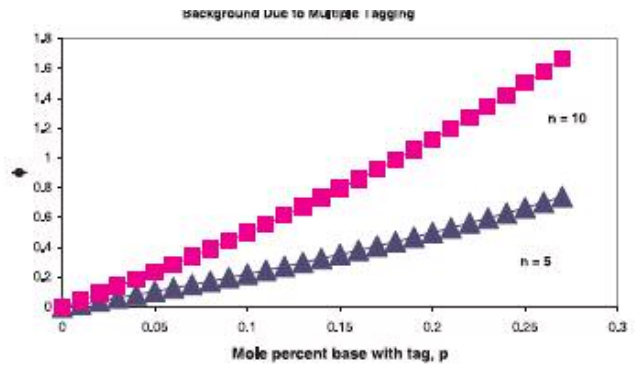


Figure 3. The background due to multiple tagging increases monotonically as  $p$  increases.

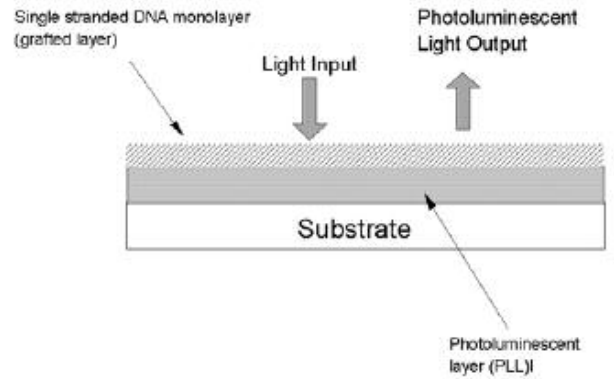


Figure 4. The basic element of the DNA chip device is shown. For the study described, the substrate is an Si wafer and the photoluminescent layer is an organic material.

### PL Spectrum of ssDNA and dsDNA on PLL Film

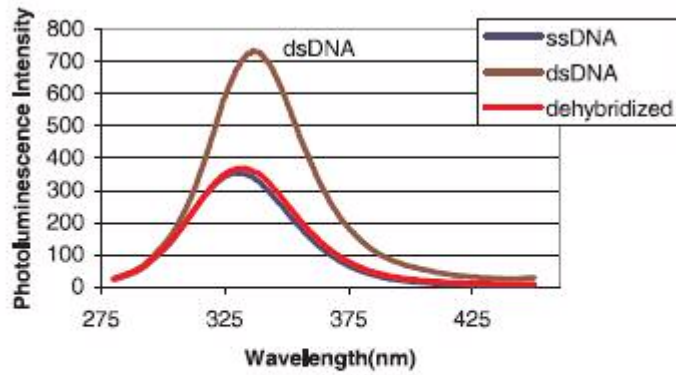


Figure 5. PL spectrum from PLL with the top DNA layer being, ssDNA, dsDNA and denatured back to ssDNA. The change in intensity,  $I_{PL,ds}/I_{PL,ss} = 2.35 \pm 0.25$ .

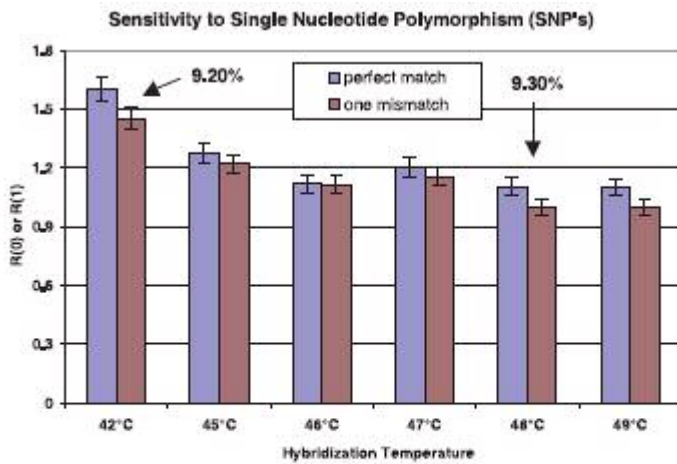


Figure 6. Behaviour of hybridization temperature on DNA binding exhibits  $< 2^\circ\text{C}$  sensitivity.  $R(x) > 1$  indicating that the PL increases upon DNA hybridization as seen in figure 5.