

**Supporting information**

# **Optical Penetration of Shape-Controlled Metallic Nanosensors across Membrane Barriers**

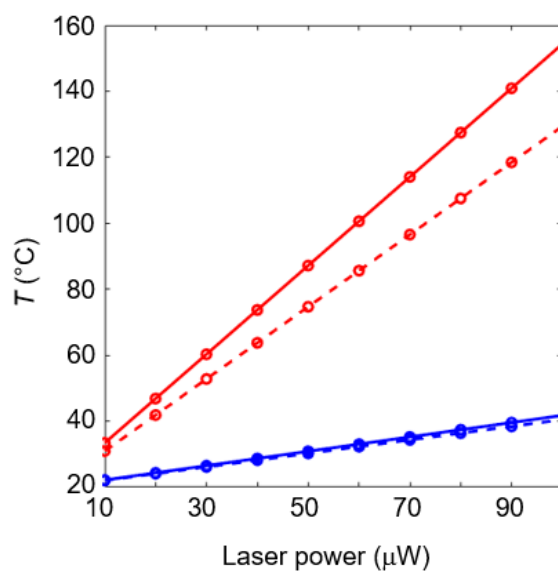
**Ancheng Da <sup>1</sup>, Yanan Chu <sup>1</sup>, Jacob Krach <sup>1</sup>, Yunbo Liu <sup>1</sup>, Younggeun Park <sup>2</sup> and Somin Eunice Lee <sup>1,\*</sup>**

<sup>1</sup> Department of Electrical & Computer Engineering, Biomedical Engineering, Biointerfaces Institute, Applied Physics, Macromolecular Science & Engineering, University of Michigan, Ann Arbor, MI 48109, USA

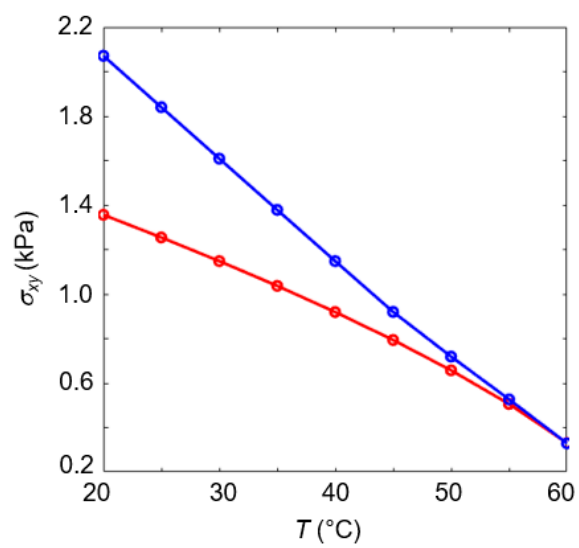
<sup>2</sup> Department of Mechanical Engineering, University of Michigan, Ann Arbor, MI 48109, USA

\* Correspondence: [slee@umich.edu](mailto:slee@umich.edu)

## Supplementary Figures

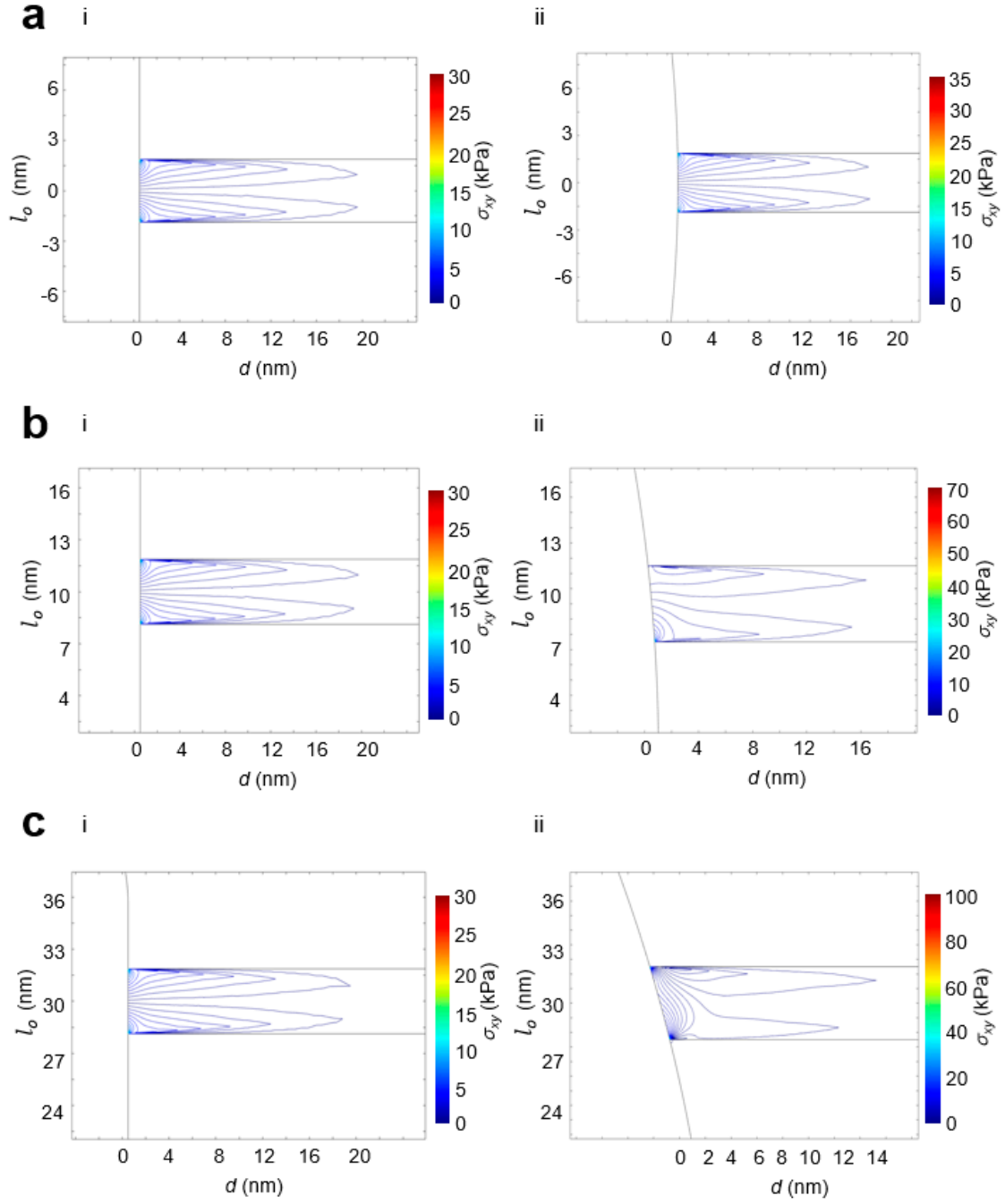


**Figure S1. Photothermal heat generation of metallic-based and dielectric-based nanosensors.** Interface temperature for AuNR (red solid line), AuBP (red dashed line), siNR (blue solid line), siBP (blue dashed line). Nominal radius  $r = 50\text{nm}$ , aspect ratio = 4.

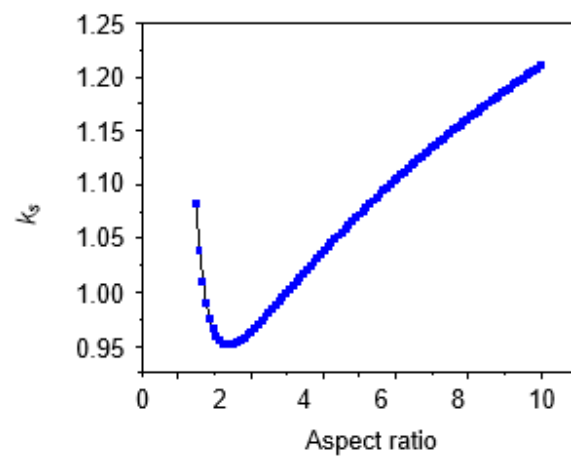


**Figure S2. Lateral stress of AuNR and AuBP under environmental temperature variation.**

Average interface stress shown for AuBP (blue line), and AuNR (red line).



**Figure S3. Local lateral stress at the nanoparticle-membrane interface.** Local lateral stress contours at the nanoparticle-membrane interface as a function of  $l_o$ . **(a) i)** AuNR and **ii)** AuBP.  $l_o = 0$  nm,  $\omega = 10$  kHz, **(b) i)** AuNR and **ii)** AuBP.  $l_o = 10$  nm,  $\omega = 10$  kHz, **(c) i)** AuNR and **ii)** AuBP.  $l_o = 30$  nm,  $\omega = 10$  kHz.



**Figure S4. Friction factor.** Graph of friction factor  $k_s$  versus aspect ratio.