Supporting Information

Monolayer WS_2 nanopores for DNA translocation with light-adjustable sizes

Gopinath Danda[1,2‡], Paul Masih Das[1‡], Yung-Chien Chou[1], Jerome T. Mlack[1], William M. Parkin[1], Carl H. Naylor[1], Kazunori Fujisawa[3], Tianyi Zhang[4], Laura Beth Fulton[1], Mauricio Terrones[3,4,5], Alan T. Charlie Johnson[1], and Marija Drndić[1]*

[1]Department of Physics and Astronomy, and [2]Department of Electrical and Systems Engineering, University of Pennsylvania, Philadelphia, Pennsylvania, 19104, United States

[3]Department of Physics, Center for 2-Dimensional and Layered Materials, and [4]Department of Chemistry, and [5]Department of Materials Science and Engineering, The Pennsylvania State University, University Park, Pennsylvania 16802, United States

*To whom correspondence should be addressed: e-mail, drndic@physics.upenn.edu.

Contents:

1. **Effective nanopore diameter of pore D under laser exposure**
2. **Pore expansion rate as a function of laser power density**
3. **Laser exposure effects on an intact WS_2 membrane**

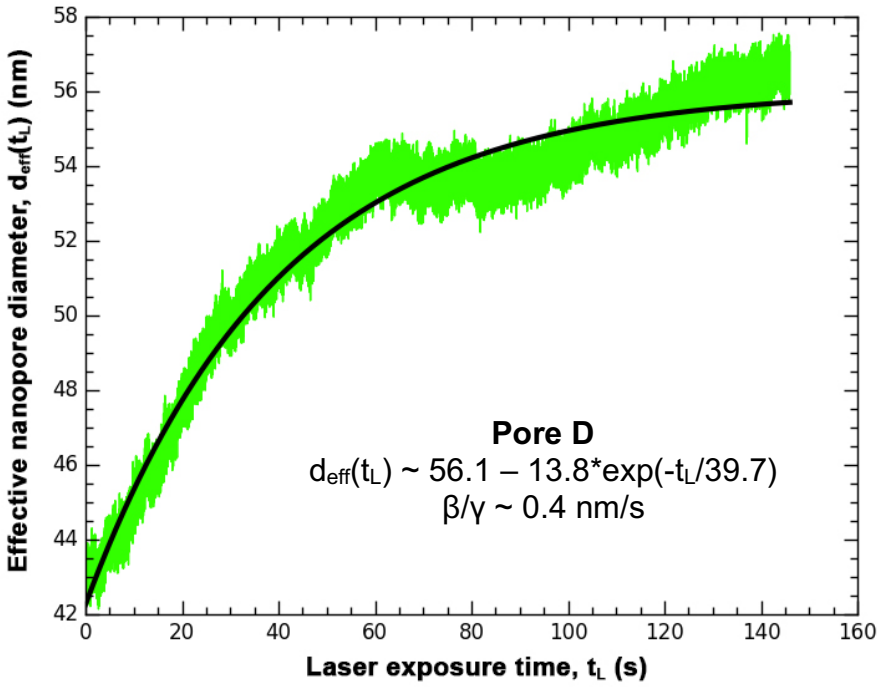

Figure S1. Effective nanopore diameter of pore D under laser exposure. Diameter d_{eff} ($d_{eff} = (I_B/V_B)/\sigma$) of pore D was calculated from the obtained conductance measurements (see Figure 6). Periods with the laser (power density = 3 W/cm^2) on were extracted, concatenated, and fit with the exponential trend discussed in the main text to yield functional parameters α = 56.1 nm, β = 13.8 nm, and γ = 39.7 s. The initial expansion rate of the pore was determined to be 0.4 nm/s using β/γ as discussed in the main text.

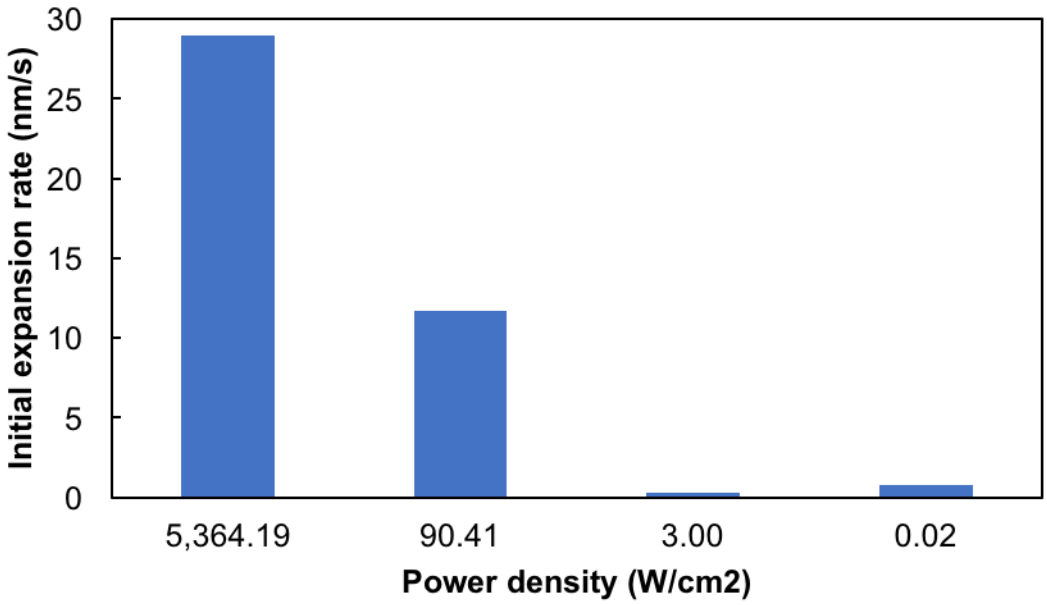

Figure S2. Pore expansion rate as a function of laser power density. The initial expansion rate of different nanopores under varying laser power densities was calculated *via* conductance measurements before and after 5 s of laser exposure (see Figures 6 and S1). A direct correlation between rate and power density was observed.

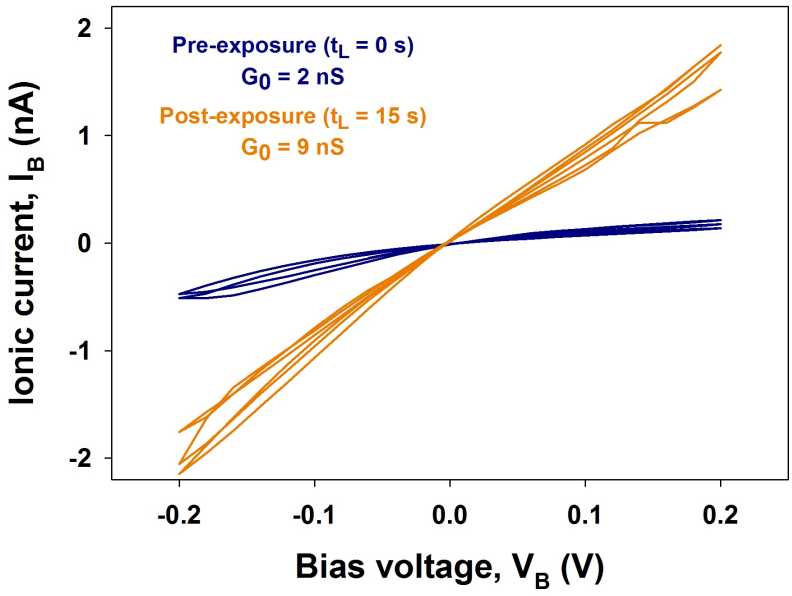

Figure S3. Laser exposure effects on an intact WS_2 membrane. IV curves were obtained before and after laser exposure (power density of 90 W/cm^2, t_L = 15 s) on an intact WS_2 membrane containing no nanopores. The observed increase in conductance, G_0, from 2 to 9 nS suggests that the laser aids in creating ionic channels through existing defects. Under additional exposure with a higher power density (power density ~5400 W/cm^2, t_L = 6 s), no increase in conductance was observed, indicating that exposed edges, such as those formed during e-beam nanopore drilling, are necessary to form larger channels.