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High Temperature Baking as a Means of Controlling Solid-state Nanopore Fabrication and Stability NATHAN WALSH, DENIS TITA, SANTOSHI NANDIVADA, RYAN ROLLINGS, JIALI LI, University of Arkansas —
Solid-state nanopores have been of interest in single biomolecule analysis due to their ability to be tunable in dimension and robust nature. The ability to withstand wide variations in temperature, salt, denaturing agent, and pH while maintaining pore stability has made it a promising technology in detecting biomolecules at the single molecule level. One of the current methods for fabricating these solid-state nanopores uses a low energy ion beam, ~ 3 keV, incident on a 100nm diameter hole in a silicon nitride membrane to close it to a smaller diameter. Because of individual variability in between samples, the time taken for pore closure can vary from a matter of seconds to a few hours. Because the error in the measured final diameter of the nanopore is proportional to the closure rate, this causes a wide variability in final nanopore diameter. In addition, the variations in stability and electrical noise level of these nanopores at experimental solution condition have also been observed. Here we use a tube furnace to investigate adventitious carbon and its effects on the closure rate. We also use the tube furnace to bake the silicon nitride nanopores after fabrication and investigate the effects on the stability of the pore and electrical noise in solution.

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