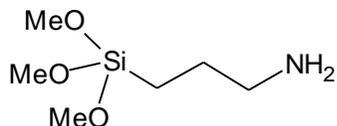


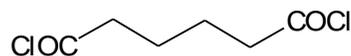
Protocol- Chemical modification of solid state nanopore (SSN)

**Reagent:**



**1**

3-aminopropyltrimethoxysilane  
MW: 179.29 Da



**2**

adipoyl chloride  
MW: 183.03 Da

- I. Cleaning and oxidation of the SSN surface  
Place the SSN chip(s) in a 10 mL beaker, add 1 mL isopropanol to wet the pore, followed by washing the pore three times with double distilled (DD) water, and pipette dry. The SSN was then oxidized in heated piranha solution (1:3 H<sub>2</sub>O<sub>2</sub>:H<sub>2</sub>SO<sub>4</sub>) for 15-30 min (the small hot plate setting at 120 °C), followed by rinsing in DD water five times, then methanol for one time, and drying on hot plate for 5 min (setting at 120 °C).
- II. Silanization of the SSN chip.<sup>1</sup>  
Place the SSN chip(s) in a 10 mL beaker, add 1.96 g methanol and 0.04 g reagent **1** (note: add methanol first). The reaction takes three hours with magnetic stirring at room temperature, make sure the stir bar does NOT touch the chip. Then pipette out the solution, add 3 mL methanol in the beaker, stir for 5 min. Repeat the methanol washing for 8 time (only the first three wash need to be stirred for 5 min). Transfer the chip(s) to a small Büchner Flask (vacuum flask) which is connected to N<sub>2</sub>. Purge N<sub>2</sub> for a few minute at room temperature (you should see the continuous bubbles in the oil trap), then heat the flask on a hot plate at a setting of 120 °C for 30 min with continuous purge of N<sub>2</sub>. The N<sub>2</sub> purge should continue during the cooling process too!
- III. Functionalization of SSN with negative surface.  
Place a freshly prepared SSN chip from step II in a 10 mL three-neck flask, add 1.90 g anhydrous toluene and 0.1 g reagent **2** (note: add toluene first). Immediately purge the flask using a Schlenk line using argon (Note, this experiment is water sensitive and needs to be conducted in Dr. Gitsov's lab at SUNY-ESF. You should contact one of his graduate students at least one hour ahead of time, since anhydrous toluene distillation takes time to run). After a 30 min reaction, pipette out the solution, use fresh anhydrous toluene to wash the chip 8 times, then reconnect the three-neck flask to the Schlenk line to dry the chip (I found that it's more efficient to open one of the neck during the drying process).

**Note:** the coating of the positive surface (reagent **1**) can be performed in CNF using MVD 100. Please contact Chris Alpha [alpha@cnf.cornell.edu](mailto:alpha@cnf.cornell.edu) to get the training. Theoretically, this instrument can provide the monolayer coating that is 10 tens thinner than the liquid method.

1. Wanunu, M. Meller, A., *Nano Letters*, **2007**, 7, 1580-1585.