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Fabrication and Characterization of High Aspect Ratio PMMA Membranes for Filtering and Sensing Applications THOMAS HOKE, James Madison University — We report on the fabrication and function of high aspect ratio membranes for filtering applications in micro fluidic devices. We describe a new technique that enables us to construct a 40-90 microns thick membrane spanning a 3mm hole in a poly methyl methacrylate (PMMA) substrate. Polydimethylsiloxane (PDMS) is used to fill the hole in the PMMA. Once a liquid monomer solution is flowed over the substrate and cured with photo-polymerization, the PDMS is then removed, leaving a thin membrane spanning the hole. Filters are made from these membranes by etching silica or nickel micro particles that are embedded in the monomer solution. One goal of this project is to quantify how variables such as particle concentration, particle size, and etch time affect the filter porosity. This was done with membranes embedded with SiO_2 by creating a series of filters with various bead sizes and etch times. SEM was used to measure the thickness and structure of the membrane, and dynamic light scattering (DLS) was used to measure the amount of particles removed from a controlled suspension. These filters could successfully filter out particles as small as 3-10 microns. We will also report on the use of Ni in the filters to filter out His-tagged proteins due to the fact that are attracted to Ni ions.

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