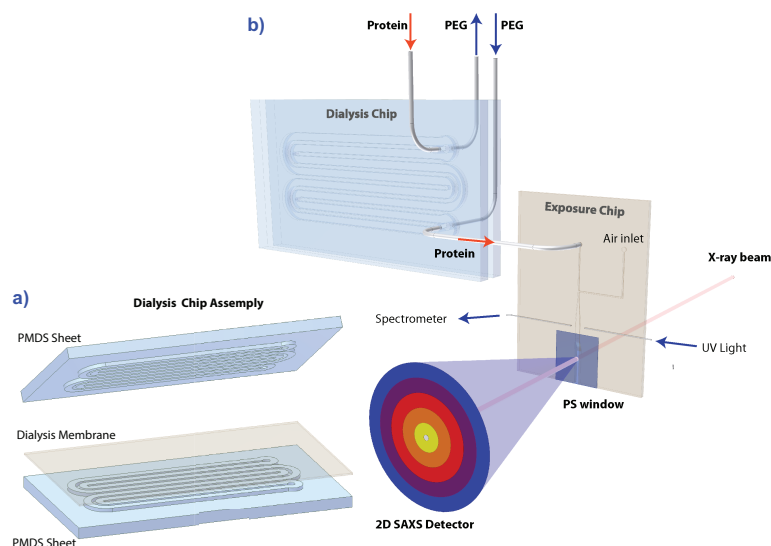


Lab-on-a-chip for Biological Small-Angle X-ray Solution Scattering

Richard Gillilan (reg8@cornell.edu), Macromolecular Diffraction Facility
Cornell High Energy Synchrotron Source

Biological small-angle x-ray scattering (BioSAXS) has become a popular technique for obtaining structural information on complexes of proteins and other biomolecules in solution. A wide variety of research groups regularly visit Cornell's High Energy Synchrotron Source (CHESS) to collect this kind of scattering data. Because the technique applies solution conditions, microfluidic lab-on-a-chip methods can allow researchers to change solution components, perform reactions, concentrate solutions, or even separate molecular species *in situ* at the synchrotron beamline.



Microfluidic dialysis on a chip used to create real-time concentration series on protein solutions at the synchrotron beamline (see Ref 2).

Following previous lab-on-a-chip work done in our lab [1,2] (especially [2]), this project will explore the alternative of using *ultrafiltration* to create concentration series. Both simulations (COMSOL) and fabrication will be involved. A chip containing filtration membrane with integrated UV-absorption monitoring will be designed and tested. Time permitting, successful chips will be tested *in situ* with synchrotron radiation. Students will gain experience with COMSOL Multiphysics software. Fabrication experience (machine shop, nanofabrication, bio wet lab skills) are a plus, but CNF training will be provided, if necessary. Contact R. Gillilan to discuss details.

[1] Møller, M., Nielsen, S. S., Ramachandran, S., Li, Y., Tria, G., Streicher, W., . . . Vestergaard, B. (2013). *PLoS One*, 8(9), e74783.

[2] Skou, M., Skou, S., Jensen, T. G., Vestergaard, B., & Gillilan, R. E. (2014), 47(4), 1355-1366.