## Virus Particles by Dynamic Light Scattering (DLS) Measurements

In my last position with Brookhaven Instruments I had the pleasure to work with one of the world's experts on fish viruses, Dr. James Winton, at the USGS Western Fisheries Research Center in Seattle Washington (https://profile.usgs.gov/jwinton). We attempted to measure cultured virus particles the Fisheries Center has been working on that impact both sport and commercial fish populations.

To grow a virus, you first need to grow the cells that the virus type typically infects. In this case, Chinook salmon embryonic cells were grown in minimum essential media (MEM) of which there are a number of varieties (I counted around 20 on the Sigma-Aldrich website alone). After infection of the cells, the virus replicates and either bursts the cells or is expressed into the media through the cell membrane. Removal of the cell fragments by centrifugation or filtration leaves the virus particles in solution (assuming the pores of the filtration membrane are large enough for them to pass through).

MEM is comprised of inorganic salts and amino acids. Since it is typically sterile filtered, MEM is very clean (a requirement for a good light scattering experiments) and free of extraneous dust particles. The inorganic salts are not an issue since they are sub nanometer, but the amino acids are large enough to be measureable in the concentrations used in a typical light scattering experiment. Simplistically, dynamic light scattering measures in intensity mode, and the intensity distributions are weighted by the diameter **d** raised to the seventh power, averaged over the diameter of all contributions raised to the sixth power (**d**^7/**d**^6). This means that the very small particles present in very large amounts (amino acids and other small cellular by-products from the culture) should be largely swamped by the signal from the virus particles as they are expressed into the culture media. Transforming the data to a number weighted distribution mode (**d**^2/**d**) shows only the signal from the media, since the virus particles are greatly outnumbered by the amino acids.

How is this useful? If you wanted to monitor the progress of virus expression in a culture media, you should be able to do it by dynamic light scattering if you have a protocol for removing the cells and cell fragments. You can read the details in the poster I presented at Pittcon in Philadelphia in 2013 on the Brookhaven Instruments web site (www.brookhaveninstruments.com). Scroll down the left side of the home page to find it. Thanks for reading!