

Light Scattering Investigations of Cod Muscle Proteins

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The use of light scattering for the investigation of proteins, protein aggregates, viruses and even DNA molecules has become widespread during the last couple of decades¹.

Extensive measurements of the aggregation and gelation of miscellaneous proteins have been done, with globular, easily isolated food proteins getting the most attention. In comparison, research of muscle proteins has been somewhat overlooked, especially with regard to the aggregation of these isolated proteins in solution. A few papers have been published that describe the use of light scattering to investigate the most important myofibrillar proteins, myosin and actin. These would usually be the isolated proteins from different animals (for example, rabbit myosin²). Light scattering is taken to mean in this context both static (SLS) and dynamic light scattering (DLS or PCS). The domain of these techniques is the measurement of molar weight, size, shape (SLS) and diffusion (DLS).

The usual PCS experiment setup involves determining the autocorrelation function of scattered light intensity. This autocorrelation function contains information about the diffusion of scattering units, and therefore implies the size of these scattering units. While measuring only the average intensity of scattered light (as is done in SLS) can yield only average values of size and molar weight, the very nature of PCS theory allows for the observation of species of different size in the sample measured. This makes PCS compatible for measuring aggregation processes, in which monomers and aggregates of very different size may be present.

Recent papers report the investigation of myosin from two different fish, walleye pollack³ and white croaker⁴. Our research is geared toward elucidating the properties of muscle proteins from fish of the Gadidae family (cods), whose muscles tend to contain less phospholipids. So far, our measurements show that cod myosin follows the aggregation pattern described for the white croaker, and also that the concentration dependency of cod myosin aggregate size is consistent with that of rabbit myosin. We will present these results in detail, along with a more detailed layout of our frame of work and the theory behind light scattering measurements.

References:

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