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Cutting edge developments in the analysis of protein colloids in amyloid fiber formation

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Abstract

New techniques to calculate the diameter of protein colloids formed in amyloid fiber formation have been developed using ultraviolet-visible spectroscopy. Protein nucleation units, or more commonly referred to as protein colloids, are formed in the process of aggregation and are believed to be intermediates in protein self-assembly and formation of amyloid fiber. Deposition of the amyloid fibers in biological tissues leads to several different diseases, most notably Alzheimer's disease. Lysozyme was incubated at pH 2.0, 55°C, an environment that promotes amyloid fiber formation. The protein colloids present in the supernatant of the samples after centrifugation were studied over a period of 30 days. The OD 280 assay detects total protein concentration, which is based on absorption of radiation in the near UV. The colloidal gold assay and modified Lowry DC protein assay only measure protein colloidal sphere surface protein concentration. Due to the surface plasmon resonance, the light absorption spectrum changes when proteins bind to colloidal gold particles. Using the measured protein concentration on the surface of protein colloids along with the total measured protein concentration in the entire protein colloidal spheres, an interior protein concentration for all colloids is obtained. The protein colloidal sphere size can be calculated by using the ratio between the interior protein concentration and total protein concentration. The colloidal gold assay and DC protein assay are both independently effective in analysis of surface protein concentration of protein colloidal spheres. The DC protein assay incubation time is quite short, producing a means for rapid data production. The DC protein assay is also more reliable than the colloidal gold assay in accuracy and precision of results.

Biography

Jonathan R. Anson has completed his Bachelor of Science degree in Computer Engineering and a Master of Science degree in Biotechnology at Florida Institute of Technology in Melbourne, Florida. He has worked as an engineer on various projects with NASA engineers in Florida's Space Coast. During his studies in Biotechnology, he conducted extensive laboratory research at Florida Tech on Alzheimer’s disease while collaborating with NASA researchers.