2017

P1: Salt Concentration and pH Affect the Size of Elastin-Like Polypeptide Nanoparticles

Bryce Noe
Cleveland State University

Ilona Tsuper
Cleveland State University

Daniel Terano
Cleveland State University

Richard Schmitt
Cleveland State University

Salt Concentration and pH Affect the Size of Elastin-Like Polypeptide Nanoparticles

College of Sciences and Health Professions and
Washkewicz College of Engineering

Student Researchers: Bryce Noe, Ilona Tsuper, Daniel Terrano, and Richard Schmitt

Faculty Advisors: Nolan B. Holland and Kiril A. Streletzky

Abstract

The transport of therapeutic drugs to specific tissues in the body can be accomplished using nanoparticles that encapsulate the drugs. Elastin-like polypeptides (ELP) is a class of materials that can reversibly form such nanoparticles in response to environmental cues. FLPs transition from soluble compounds to a phase separated system under particular solution conditions and have been used to produce temperature responsive surfactants. When these ELP surfactants are above their transition temperature, they spontaneously form energetically stable spherical micelles. When the temperature drops below the transition temperature, the micelles break apart and the ELP goes into solution. The size of these micelles can change depending on the solution conditions, including pH and salt concentration. We studied how the size of the micelles are affected by these solution conditions by using dynamic light scattering to determine the diameter of the ELP micelles. When the salt concentration increased, we found that there was a region of constant size followed by a region of linear increase in diameter. Following the linear region, there is a jump in micelle size. As the pH of the solution increased from neutral pH, the diameter drastically increased. As pH decreased from neutral pH, the diameter slightly increased.