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Apparent Sphere to Elongated particle transition of Elastin-Like Polypeptide Thermoreversible micelles KAITLIN VANDEMARK, ALI GHOORCHIAN, NOLAN HOLLAND, KIRIL STRELETZKY, Cleveland State University — Biosynthesized polymers can be designed to assemble into environmentally responsive nanoparticles. Such a system consisting of an oligomerization domain connecting three elastin-like polypeptide (ELP) chains has been developed. These polypeptides reversibly transition from aqueous soluble polymers to amphiphiles when the temperature is raised above the ELP transition temperature. As amphiphiles these can assemble into micelles under appropriate solution conditions. A particular system has been designed to reversibly form micelles at a neutral pH. However, the shape and size of micelles was found to depend strongly on salt concentration. We used polarized and depolarized dynamic light scattering to study temperature-driven formation of micelles of various geometries under different solvent conditions. We also monitored the sphere-to-elongated particle transition of the ELP micelles with addition of salt. The apparent dimensions, shape, and dynamics of micelles strongly depend on salt concentration, with two distinct salt regimes and a broad transition region observed. At low salt concentration (0-15 mM), largely spherical micelles were found with a hydrodynamic radius of 10-15 nm. At intermediate salt concentration (15-35 mM) the transition from spherical to elongated micelles is observed. At high salt concentrations (above 35 mM), the micelles again reach a stable structure consisting of highly anisotropic particles with an aspect ratio of higher than 10.

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