Particles with Tunable Size in Relation to Fiber Length

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Amphipathic, self-assembly peptides consist of alternating hydrophobic and hydrophilic components. When introduced to water, the peptide self-assembles by burying hydrophobic residues while exposing hydrophilic residues to water. This gives rise to beta sheet fibrils. Using desolvation, fibers are able to form microparticles. This study examined the relationship between the lengths of the fibers, microparticle size. It was hypothesized that fiber length would influence particle size. Q11 peptides were synthesized using a standard Fmoc Solid Phase Peptide Synthesis protocol, and purified using High Pressure Liquid Chromatography (HPLC). Matrix-Assisted Laser Desorption and Ionization Time of Flight Mass Spectrometry (MALDI-TOF) was used to ensure the products were present and pure. Fiber length was altered through: sonicating the fibers before desolvating them, and desolvating them at different times after sonication; vortexing, or both vortexing and sonicating the Q11 in preparation for fiber formation; and dissolving the peptide at different concentrations. The particles were observed with fluorescent microscopy and the diameters were measured using ImageJ. Particle size increased with the amount of time the fibers incubated after sonication and before desolvation. The data suggests vortexing the Q11 during the dissolving process resulted in smaller particles than vortexing and sonicating it, though the difference was minimal. Higher concentrations of Q11 resulted in larger particles than lower concentrations. It can be concluded that the size of the microparticles can be controlled by breaking up the fibers and forming microparticles with them at various intervals, or by forming fibers with differing concentrations of self-assembly peptide.

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