Title: Creation of Soft Core-ShellColloidal Particles

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Colloids are a type of mixture of small solid particles in a solvent. They are useful as model atoms for studying phenomena like the glass transition since the colloids are large enough, compared to real atoms, to be seen under a microscope. In previous research, both hard sphere and soft sphere particles have been created. Hard sphere particles are useful because their interactions are easy to model since they have no interpenetration. However, soft sphere particles are more important because, despite the increased difficulty in modeling their interactions due to interpenetration, the soft shell particles act more similar to real atoms. The particles being studied in my research are different from previous colloid particles because they are thermally responsive. This means that they change size based on the temperature of the mixture, which indicates the volume fraction changes and consequently that their phase behavior can be controlled to make them solid, liquid, or glass. Since particles with these properties are not commercially available, I have focused on the creation of these particles in the lab. The particles were created in two parts, the hard core first and then the soft shell surrounding it. Both components were grown through a radical polymerization reaction and then placed in dialysis for a week to remove impurities. The cores were also synthesized with a fluorescent dye, Nile Red, so they could be seen under a fluorescent microscope. After the completed reaction the particles were analyzed using dynamic light scattering (DLS) to find that the particles were stably monodispersed. The size of the particles and the temperature dependence of the size was also found using DLS. In the future, the interaction potential of the particles will be found using optical tweezers and the rheology of the particles will also be measured.