

SOCIETY OF PHYSICS STUDENTS (SPS) COLLOQUIUM

Structure and dynamics of polymer  
nanoparticles: exploring their potential for  
controlled drug delivery

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Issues remain unresolved in chemotherapy including: an inability to effectively target cancerous tissue, loss of low molecular weight medicines to the RES system, high cytotoxicity of currently used drug carriers, little control over medicine release upon arrival to the target. Hydroxypropylcellulose (HPC) nanoparticles (microgels) may be able to surmount these obstacles.

HPC is a high molecular weight FDA approved polymer with low cytotoxicity and a critical temperature,  $T_c=41\text{C}$ . We synthesized HPC microgels and studied their structure and dynamics at a variety of temperatures and scattering angles using Static and Dynamic Light Scattering.

Light scattering data was fit to a sum of stretched exponentials and fitting parameters were analyzed. This method allowed us to separate complex spectra into additive terms/modes which represent particles with differing properties within the sample. The analysis yields each mode's average hydrodynamic radius, diffusion coefficient, and relative weight. It also reveals significant volume shrinkage of microgels above  $T_c$ , which is essential to pharmaceutical applications. The shrinkage is reversible and depends on the heating rate.

**WHERE**

SI – 117 (room next to the Physics Computer Lab)

**WHEN**

**11:55 am**

**Thursday, February 15, 2007**

*Pizza served before the colloquium*