

Polymersomes (Vesicles)

Polymersomes are vesicles made from amphipathic diblock copolymers. They self-assemble into spherical vesicles similar to liposomes. Due to the increased length and strength of the polymer, polymersomes have a thicker membrane and durability as compared to liposomes. As a result, polymersomes have potential for medical imaging and drug delivery applications.

The goal of this note is to determine a method for mediating the destruction of these vesicles in order to give better control over the release of the encapsulated drug *in vivo*.

Polymersomes are fabricated using a thin film method. The polymer and photo-oxidizer are dissolved in an organic solution, plated onto a glass vial and hydrated with an aqueous solution containing the drug. The solution is sonicated and the polymersomes self assemble into solution. The size of the polymersomes is important in order to reduce any possible immunological response for *in vivo* applications. Ideally, the polymersomes should be less than 150 nm in diameter. Dynamic light scattering is the simplest and fastest way of determining the size, and we employ the DynaPro-LSRTC for this purpose.

Polymersomes fabricated in this method and loaded with the agent of interest, had a diameter of less than 300 nm and exhibited no significant deviation in size from control unloaded polymersomes. Thus, we found it possible to successfully load agents into the membrane and core of the polymersomes without significantly altering their size.

Now that we know that physiologically useful sized polymersomes can be fabricated, we can move to the next stage of determining the optimal method for drug release applications. Furthermore, if clinical trials are necessary, the polymersomes will need to be further processed via extrusion to a monodisperse size of approximately 200 nm, which will require additional size characterization to ensure this goal is met.

This note graciously submitted Ali Dhanaliwala, The University of Pennsylvania, Philadelphia, PA 19104-6321.

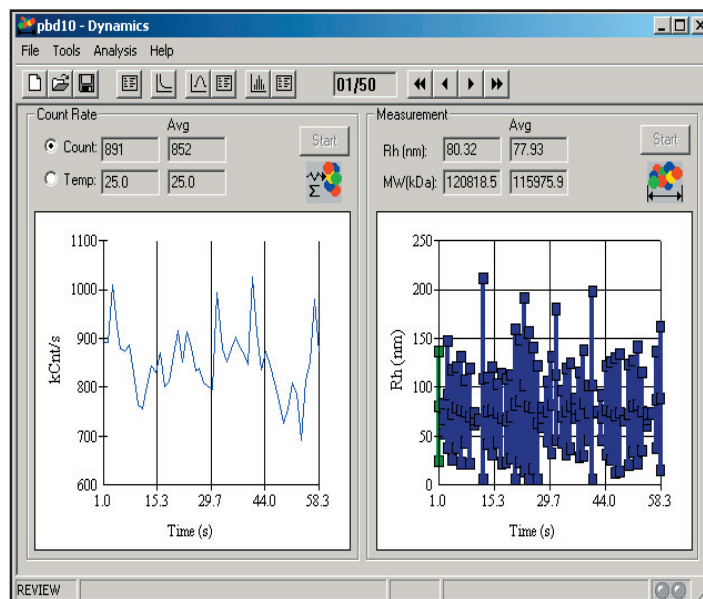


Figure 1. Size determination of PEO-PBD polymersomes.

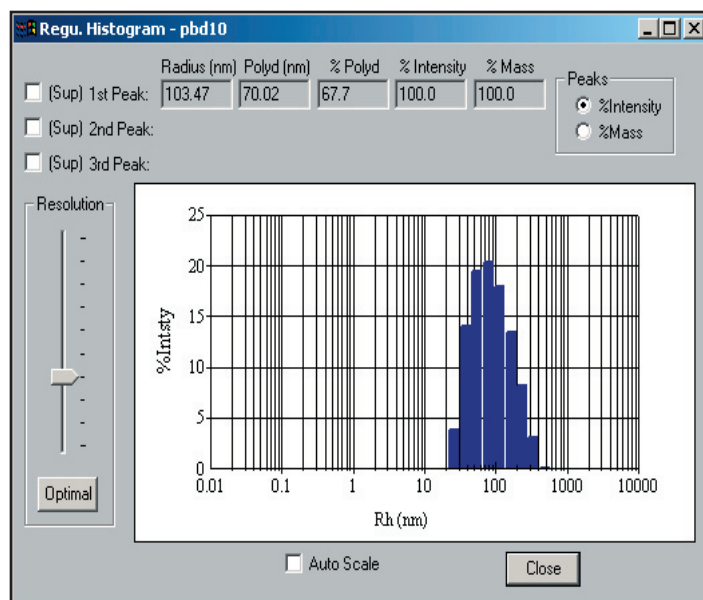


Figure 2. Regularization histogram for PEO-PBD polymersomes.