

Characterization of poly(D,L-lactide-co-glycolide) Nanoparticles

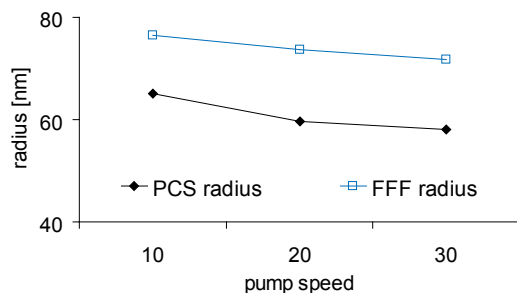
Much attention has been paid to biodegradable nanoparticle systems. It is well known that parameters such as particle size and shape are important for blood circulation time. We used the methods of Photon Correlation Spectroscopy (PCS) and Asymmetrical Flow - Field Flow Fractionation (F-FFF) to assess sizes of biodegradable nanoparticles.

The systems used were colloidal aqueous suspensions of nanospheres consisting of the biodegradable polyester Resomer RG 503 (0.5% w/v). The particles were produced using the solvent deposition method. To check the validity of the F-FFF method, particles with different sizes were produced by increasing the injection velocity of the acetone-polymer solution into the water.

An Eclipse Fractionation system was connected to a DAWN EOS and an RI detector. Before measuring, 200µl of the probes were diluted to 1ml with the background medium 10^{-3} mol/l KCl. 100µl were injected (Spacer: 350µm). A channel flow of 1ml/min was kept constant while the cross flow decreased in two steps from 1ml/min to 0.1ml/min. Data were evaluated using the Mie scattering method (in the Particles module of the ASTRA software).

The size differences (Fig. 1) between both methods are based on the different phenomena that are used for the measurements (dynamic and static light scattering). But to show changes in particle size, both methods are quite useful. The values of the radii we obtained show a known phenomenon: a *decrease* in size with *increasing* injection velocity. That means that even small size changes of these biodegradable nanoparticles can be detected via PCS and FFF—as in the case here, where just a few just a few nanometers made the difference.

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Nanoparticle radii by PCS and F-FFF, produced with different injection velocities

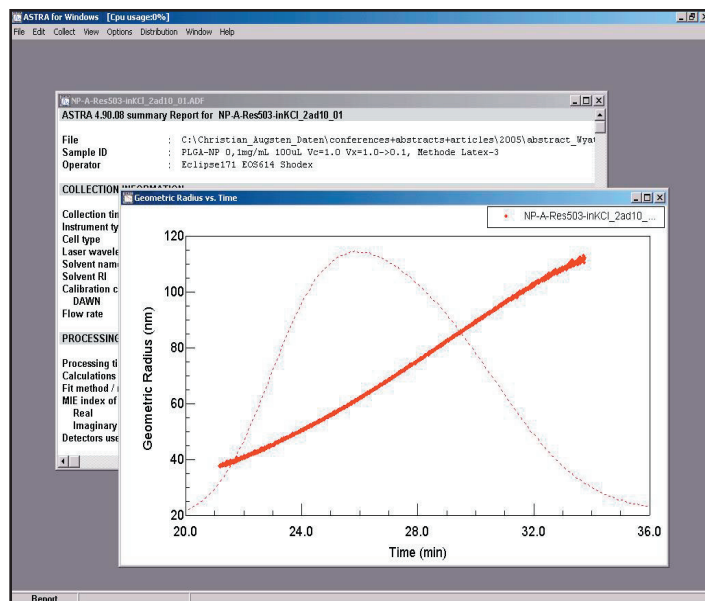


Figure 1. Geometric radii of nanoparticles calculated from scattering signals (channel 4 to 17). Nanoparticles produced with pump speed 10.

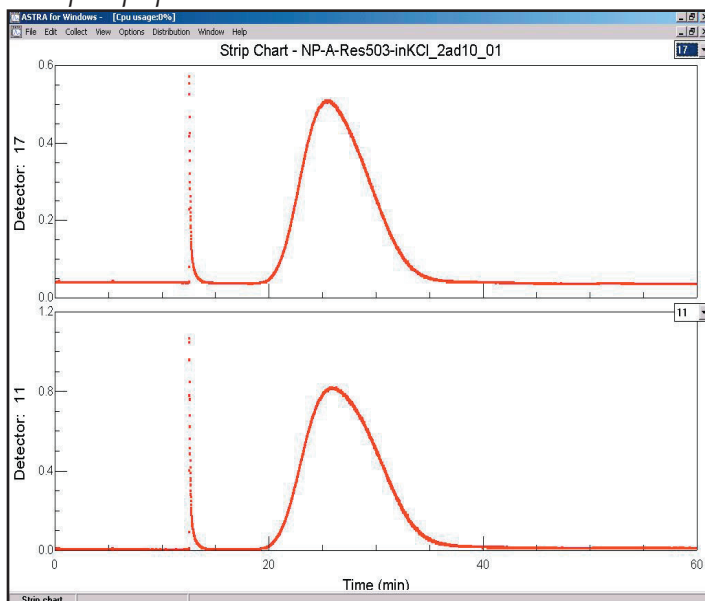
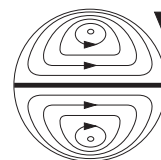


Figure 2. Signals received from scattering detectors, channel 11 (90°) and channel 17 (141°). Nanoparticles produced with pump speed 10.



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