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## Encapsulation of nanoparticles in composite gel microparticles for lung imaging and drug delivery

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The intravenous delivery of composite gel microparticles (cGMPs) offers a platform for localized treatment of lung cancer. We describe a method for fabrication of cGMPs with average diameters of 35 to 100  $\mu\text{m}$  using shear emulsification and microfluidic droplet generation. We characterized the particles and describe the performance of these particles *in vivo*. Biodistribution of the cGMPs was selective to the lung after intravenous injection and particle clearance from the lung occurred in 7 weeks. One-week biodistribution studies demonstrated that larger, uniform particles produced by microfluidics provided optimal targeting to lung tissue. We demonstrated that highly loaded cGMPs containing a long wavelength fluorophore allow *in vivo* analysis of particle biodistribution without the need for *ex-vivo* organ analysis. The release of camptothecin conjugates from the nanoparticles, and thus, gel microparticles, is tuned from minutes to days by altering the polarity of the nanoparticle core.

### Biography

Robert k Prud'homme is a professor in the Department of Chemical and Biological Engineering at Princeton University. He is the founding director of the Program in Engineering Biology. His research program focusses on polymer self-assembly applied to drug delivery. The development of Flash NanoPrecipitation (FNP) in his laboratory enabled the encapsulation of poorly soluble drug compounds and oligonucleotides for therapy directed towards cancer, TB, and injections. FNP is a scalable and continuous process that is enables integrated processing and spray drying for low cost oral and aerosol formulations. Under sponsorship by the Bill and Melinda Gates Foundation, the process is being adopted to formulate new compounds coming from TBA, MMV, and DNDI.

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