

Flash Nanoprecipitation to Prepare Drug Loaded Particles

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Many active pharmaceutical ingredients (API), including almost all anti-cancer drugs, are hydrophobic, making it difficult to deliver chemotherapy medications through the bloodstream. Encapsulation in nanoparticles provides a means to deliver hydrophobic anti-cancer agents. Particles below 400 nm even target cancer by getting lodged during circulation in the leaky vasculature of tumors.

We have prepared highly drug loaded particles using Flash Nanoprecipitation (FNP). In FNP a model hydrophobic drug, β -carotene, dissolved in a water miscible organic solvent was injected along with streams of water at high velocity into a small chamber. Drug particles precipitate rapidly, but are stabilized by a natural polyelectrolyte, chitosan. The mass averaged particle size was around 60 nm with a narrow distribution, and was stable either without or in saline at least 1 week. The drug loading capacity was as high as 83 wt%. The drug nanoparticles were in an amorphous state which is expected to have a higher bioavailability.

