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Impermeable metal nano-capsules for drug delivery without side effects

James Hitchcock
UK

Cancer therapeutics has dramatic side effects on healthy tissues. A prominent research area focuses on encapsulating cytotoxic drugs for targeted delivery to cancer tissues and for reduction of off-tissue side-effects. However, significant challenges remain for encapsulated clinical drugs (e.g. liposomal doxorubicin) such as: very expensive drug encapsulation; low drug loading and inefficient manufacturing process; once encapsulated drug leaching over time is often high (especially on dilution) and; typical release specifically within tumors is not achieved. Recently, we have demonstrated the efficient manufacture of impermeable metal-shell/liquid core microcapsules that permit localized delivery of active (pharmaceutical) ingredient high doses by triggering release with ultrasound at the target location. This delivery method has the potential to be superior to all previously developed encapsulation strategies because it would address all of the above challenges simultaneously: Capsules can easily be manufactured at industrial scale; high drug content can be achieved within capsule cores; No drug leaching occurs, thus preventing any side-effects prior to release activation via ultrasound treatment and; complete release of high drug concentrations can be achieved in cancer-affected areas only.

Biography

James Hitchcock is currently focusing on colloidal science, in particular metallic nanoparticle manufacture, liquid core/polymer shell microcapsules, catalysts and metal electroless deposition. His 2015 paper, 'Long-Term Retention of Small, Volatile Molecular Species within Metallic Microcapsules' successfully demonstrated, for the first time, the long term micro-encapsulation of small volatile molecules which lead to 8 patents being successfully filed and received a 'Research Excellent Award'. He is currently working to utilize this technology as a drug delivery vehicle successfully winning 2017 Wellcome Trust ISSF Award and going through to the second round of a 'Cancer Research UK Multidisciplinary Project Award 2017' grant application.

J.P.Hitchcock@leeds.ac.uk

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