

RSC Lecture held on Tuesday, 11th October 2011

ABSTRACT

Putting the Fizz into Chemistry Professor Steven M. Howdle

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Supercritical fluids have a unique combination of gas like and liquid like properties. This lecture will describe how we exploit these properties to synthesise new polymers and new materials for medical and pharmaceutical applications that could not be made using conventional solvents. One of the major attractions is that supercritical carbon dioxide (scCO₂) is inexpensive and provides an environmentally acceptable and cleaner alternative to the use of conventional organic solvents.

Polymer Synthesis: Most polymerisation studies in scCO₂ have focussed on free radical polymerisations. This presentation will describe new approaches that have been explored at Nottingham including living radical (RAFT) routes to make valuable **block co-polymers** and controlled nanostructured materials.

Polymer Processing: scCO₂ plasticises certain amorphous polymers, effectively liquefying them at close to ambient temperature. Under these conditions, it is possible to physically mix delicate protein based molecules such as growth factors or drugs within the liquefied polymer phase. Following depressurisation, drug loaded microporous foams or microparticles suitable for injection are generated. No solvent residues remain after processing and high protein loadings can be incorporated in a one-step process. Most importantly, because they are not exposed to either high temperatures or conventional organic solvents, the materials are clean, retain full activity and can be used for **tissue engineering** or **drug delivery applications**.