Siloxane Stabilisers for Free Radical Polymerisation of MMA in Supercritical CO_2

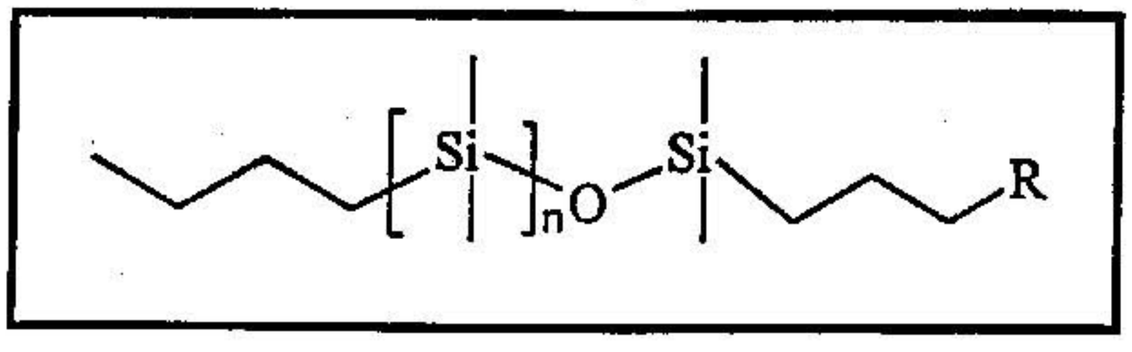
Steven M. Howdle[a], John N. Hay[b], Matthew R. Giles[a] and Robert J. Winder[b]

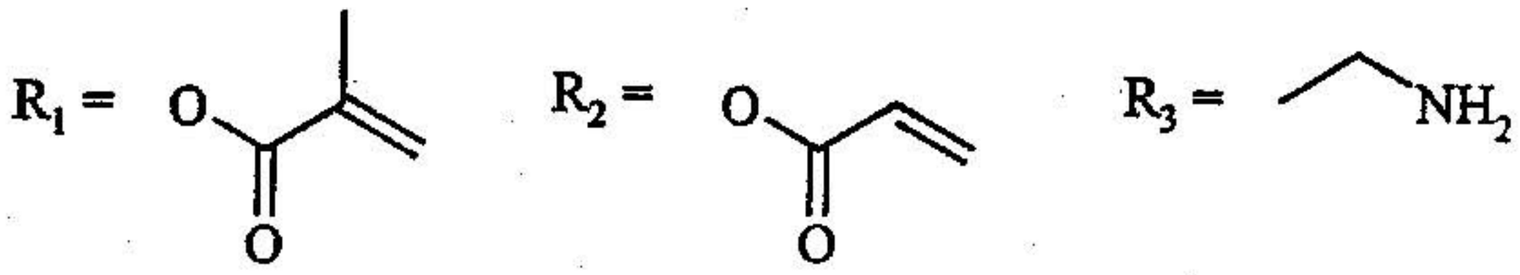
a) Chemistry Department, University of Nottingham, Nottingham, NG7 2RD
email: pczmrgx@unix.ccc.nottingham.ac.uk (Matthew Giles)
b) Chemistry Department, University of Surrey, Guildford, Surrey, GU2 5XH
email: R.Winder@surrey.ac.uk

In recent years, there has been considerable interest in finding new and cleaner alternatives to conventional solvents. Supercritical fluids, in particular $scCO_2$ show great promise[1]. One particularly important area has been the development of strategies for polymerisation in $scCO_2$.

Free radical polymerisation of methyl methacrylate in $scCO_2$ leads to polymer PMMA with low molecular weight and poor yield. However, the addition of a stabiliser leads to increased yield and polymers with narrower molecular distributions with well-defined particle sizes[2], which can be important for coating and for processability.

This poster describes the synthesis of a number of mono-functionalised poly(siloxane) stabilisers of the type shown below and their use in stabilising the free radical polymerisation of MMA. The acrylate functionality present in molecules R_1 and R_2 can undergo polymerisation and the "macro-monomers" may become incorporated into the PMMA polymer. The effect of surfactant concentration on particle size and molecular weight is investigated. The effect of pressure and temperature is also explored.





1. M. A. McHugh and V. J. Krukonis, Supercritical Fluid Extraction: Principles & Practice; Butterworth, Boston, **1994**.
2. K.A. Shaffer, T. A. Jones, D. A. Canelas, J. M. DeSimone and S. P. Wilkinson, *Macromolecules*, **1996**, 29, 2704-2706.