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LOW-TEMPERATURE FORMATION OF HIGH-T_g COLLOIDOSOMES

J.W.O. Salari[a], B. Klumperman[b]

[a]*SPC, Polymer Chemistry Group (SPC), Eindhoven University of Technology, Den Dolech 2, 5600 MB Eindhoven, The Netherlands (j.w.o.salari@tue.nl)*
[b]*Department of Chemistry and Polymer Science, University of Stellenbosch, Private Bag X1, Matieland 7602, South*

The encapsulation of active ingredients is becoming increasingly important and has exciting potential applications, for example carrier and delivery systems for drugs, proteins, flavors, gas bubbles and even living cells [1].

A promising encapsulation technique is the formation of so-called Pickering or solids-stabilized emulsions and the subsequent fusion of the particles together to form a polymer shell [2]. Heating above the glass-transition temperature of the polymer is required to obtain the so-called colloidosomes. In the case of polystyrene (pS) heating above 110 °C is necessary, which is undesirable from an industrial perspective and for temperature sensitive compounds. Laïb *et al* formed colloidosomes with low T_g polymer particles to overcome this problem [3], however the thermal properties of the resulting final polymer shell is limited by the T_g of the polymer.

In this work a technique is developed to form high T_g (110 °C) colloidosomes at low temperatures (35 to 50 °C). Initially, pS particles are synthesized by two different techniques. Dispersion polymerization is used to form monodisperse particles of 3 µm and soap-free emulsion polymerization is used to form pS particles of 0.7 µm. Both pS particles have been used to form colloidosomes in heptane or decane. The use of these oil phases allows the formation of colloidosomes at moderate temperatures, because the particular oil phases act as a ‘plasticizer’. The obtained colloidosomes are characterized by scanning electron microscopy.

[1] A.R. Studart *et al*, 17 (2007) J. Mater. Chem. 3283-3289
[2] A.D. Dinsmore *et al*, 298 (2002) Science 1006 - 1009
[3] S. Laïb *et al*, 317 (2008) J. Colloid Interface Sci. 121 - 129