Grafting of Water-Soluble Polymers onto the Surface of Latex Particles

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Grafting of water-soluble polymers onto the surface of latex particles is used in commercial emulsion polymerisations to introduce steric stabilisation and facilitate rheology control of the latexes produced [1]. There also are potential opportunities for using latex particles with grafted water-soluble polymers in functional applications. This paper will review approaches that can be used to achieve grafting of water-soluble polymers onto latex particles.

Grafting during emulsion polymerisation will be considered first in relation to the chemical processes which the most commonly-used water-soluble polymers can undergo. Results from investigations of acrylate emulsion polymerisations employing (i) alkali-soluble resins [2-5] and (ii) hydroxyethylcellulose [6-10] will be used to demonstrate the key principles for control of grafting.

An alternative approach to grafting is to attach water-soluble polymers to the latex particle surfaces *after* preparation of the latex. This is more suitable for water-soluble polymers that are sensitive to heat and free radicals, and is more appropriate to functional applications of latex particles. Proof of principle studies will be reported on the decoration of highly hydrophobic poly(lauryl acrylate) latex particles through chemical attachment of hydrophilic polymer chains.

References

(1) Lovell, P.A.; El-Aasser, M.S. (Eds.); *Emulsion Polymerization and Emulsion Polymers*, John Wiley & Sons, Chichester, 1997
(2) Lee, D.Y.; Kim, J.H.; *J. Polym. Sci., Polym. Chem.*, **1998**, *36(16)*, 2865-2872
(3) Lee, D.Y.; Kim, J.H.; *J. Appl. Polym. Sci.*, **1998**, *69(3)*, 543-550
(4) Lee, D.Y.; Kim, J.H.; Min, T.I.; *Coll. Surf., A-Physicochemical. Eng. Aspects*, **1999**, *153(1-3)*, 89-97
(5) Hwu, H.D.; Lee, D.Y.; *Polymer*, **2000**, *41(15)*, 5695-5705
(6) Craig, D. H.; *Polym. Mat. Sci. Eng.*, **1984**, *51*, 172-174
(7) Craig, D. H.; *Polym. Mat. Sci. Eng.*, **1985**, *52*, 104-106
(8) Craig, D. H.; *Polym. Mat. Sci. Eng.*, **1985**, *53*, 529-533
(9) Craig, D. H.; *Polym. Mat. Sci. Eng.*, **1986**, *55*, 486-490
(10) Annable, T. ; Gray, I.; Lovell, P.A.; Richards, S.N.; Satgurunathan, G.; *Prog. Coll. Polym. Sci.*, **2003**, *124*, 159–163