

SYNTHESIS AND CHARACTERIZATION OF NANO-COLORANTS AND THEIR USE IN HOT-MELT INK APPLICATIONS

Ahmed Al-Aeeb and Bert Klumperman

Stellenbosch University, Dept Chemistry and Polymer Science, Private Bag X1,
Matieland 7602, South Africa

ABSTRACT

Nanocolorants are a new class of materials that receive great attention in both the academy and in industry. They have been used as a replacement for traditional coloring agents such as dyes and pigments in a wide variety of applications, especially in the field of digital color printing^{1, 2, 3}.

We have utilized the inverse miniemulsion polymerization technique for the synthesis of new type of nanocolorant. Colored polymer particles of hydrophilic polymers (*e.g.* polyacrylamide) containing a water soluble dye (*e.g.* Rhodamine B) dispersed in a hydrophobic media (cyclohexane or wax) were successfully prepared via miniemulsion polymerization process. The morphology of the dye-containing latex particles can easily be recognized from SEM and TEM images (see Figure 1).

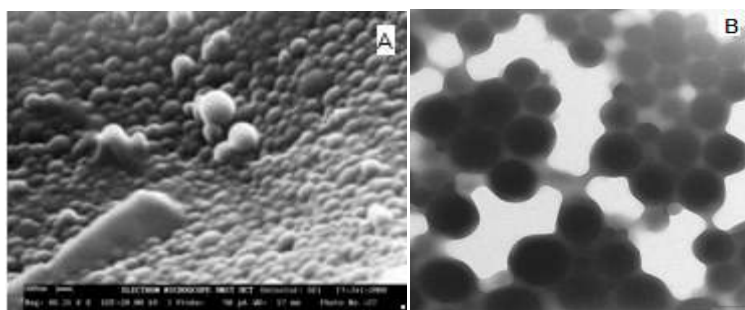


Figure 1. SEM image of nanocolorants dispersed in wax (A) and TEM image of nanocolorants dispersed in cyclohexane (B)

Nanocolorants based on a polymerizable derivative of the water-soluble Rhodamine B dye were also prepared. The architecture and morphology control of the nanocolorants as well as the dye retention properties of the nanocolorants were studied. The dye retention properties are dependent on the amount of dye loaded into the particles, the rate of dye diffusion and the type of polymer shell (*e.g.* crosslinked). The use of these nanocolorants in hot-melt ink applications will be discussed.

References:

1. Hu, Z. K.; Xue, M. Z.; Zhang, Q.; Sheng, Q. R.; Liu, Y. G. *J. Appl. Polym. Sci.* **2007**, 104, 3036–3041.
2. Hu, Z.; Xue, M.; Zhang, Q.; Sheng, Q.; Liu, Y. *Dyes Pigm.* **2008**, 76, 173-178.
3. Boehm AJ, Alban G, Koch O (2003) Nanocolorants—more than colored nanoparticles. 61st Annual technical conference (ANTEC), vol 2. pp 2419–2422.