Stimuli-sensitive microparticles for smart textile applications

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The modern research trend of textile materials is based on the need for research driven engineered products with new advanced functionalities[1]. One of the promising strategies to reach the goal of producing high added-value textiles involves functional finishing by incorporation of surface modifying systems (SMS) based on stimuli-responsive polymers. The SMS based on poly(N-isopropyl acrylamide) (PNIPAM) and chitosan (CS) is expected to add novel functionalities to textile material.

The microparticles of PNIPAM-chitosan copolymer (PN-CS) were synthesized using surfactant free emulsion method[2] and characterized by various methods such as: scanning electron microscopy, dynamic light scattering and turbidimetry. The SEM images (in dry state) show that microparticle size is in the range of 150-300 nm, while dynamic light scattering shows that hydrodynamic size of the microparticles is in range 250-500 nm at neutral pH and room temperature. Effect of temperature and pH on microparticles was investigated by dynamic light scattering and turbidimetry. The results show that, microparticles collapse at 33-34^{o}C and that this transition temperature decreases with decrease in pH. Effect of pH shows that microparticle collapse occurs at pH 4. Additionally, microparticles were characterized for their supramolecular structure.

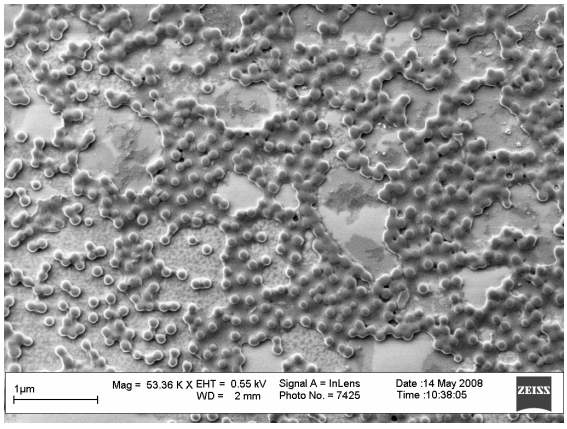

Fig. SEM image of PNIPAM-chitosan copolymer microparticles

Finally, microparticulate surface modifying systems were incorporated to textile material (cotton) by chemical and physical methods in order to obtain advanced textile material with potential applications in variety of fields.

[1] I. Holme: *Color. Technol.*, 2007, 123, 59–73.
[2] C. Lee, C. Wen, W.Chiu, *J. Polym. Sci. Part A: Polym. Chem.,* 2003, 40, 2053-2063

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