

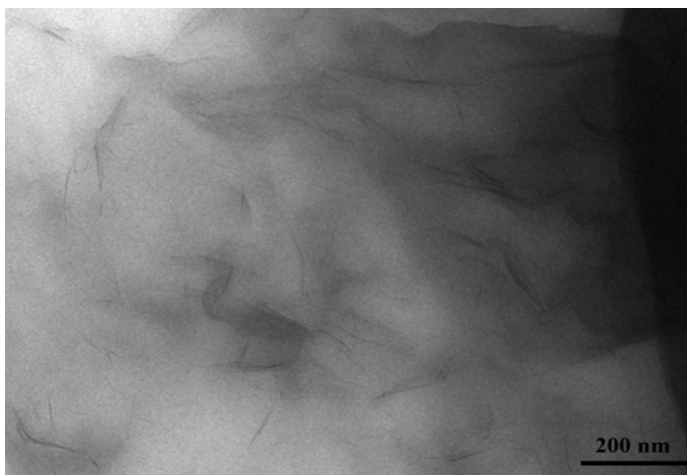
# Toughening of Paraffin Wax Moisture Barriers through Organoclay Addition

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## DESCRIPTION OF WORK

This research is part of a larger project with the objective of developing moisture barrier coatings with properties engineered to reduce their negative impact on paper recycling operations. The goals for this aspect of the project are to

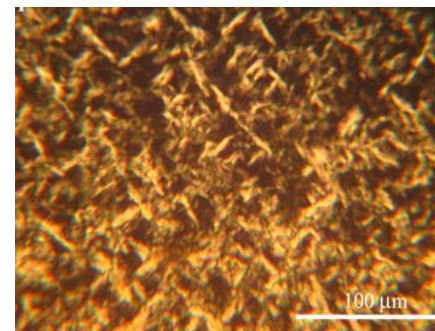
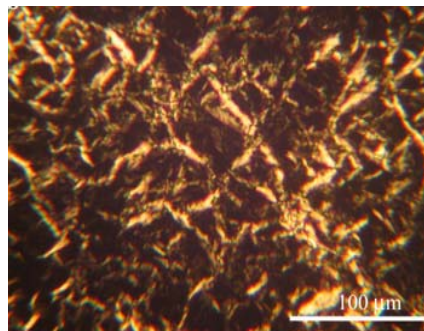
- ◆ Identify an organo-clay that is compatible with normal alkane mixtures (paraffin wax).
- ◆ Develop an efficient method for exfoliating the clay in the matrix.
- ◆ Characterize the structure and mechanical properties of the generated nanocomposites.



Bright field TEM micrograph of wax nanocomposite with 2 wt.% OMMT.

## MAJOR OBSERVATIONS

- ◆ An organically modified montmorillonite (OMMT), Cloisite 20A, which is natural montmorillonite modified with dimethyl dehydrogenated tallow quaternary ammonium, can be exfoliated and intercalated in paraffin wax above its melting point using ultrasonic processing without the use of additives.
- ◆ A concurrent enhancement of stiffness, strength and ductility in paraffin wax coatings was achieved through the addition of organo-clay.



Polarized optical micrographs of pure wax (left) and wax 5 wt.% OMMT-wax nanocomposite.

## Publications

- ◆ Wang, J., Severtson, S. J. and Stein, A. *Advanced Materials* 18(12), 1585-1588, 2006.
- ◆ Wang J., Severtson, S. J., and Geil, P. H., *Materials Science and Engineering A* (In press)
- ◆ Pu, G., Wang, J., Severtson, S. J., to be presented at the National Science and Technology Institute Nanotech 2007, May 20th - 24th, Santa Clara, CA.