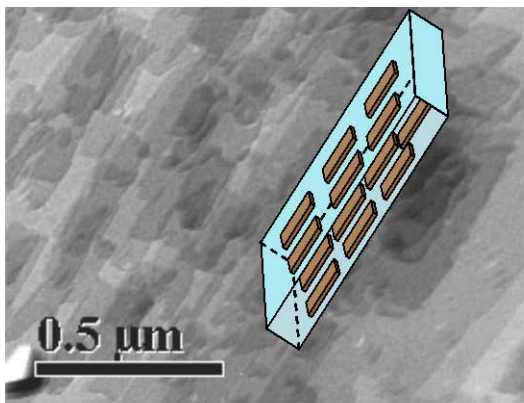
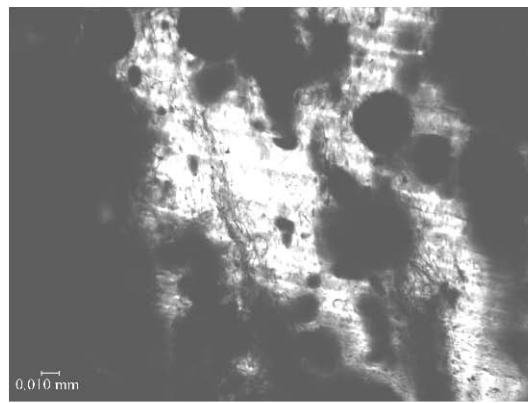


NANOFILLER DISPERSION BY CHAOTIC MIXING

Our study shows that nanofillers such as layered silicate clay, carbon nanofibers, and silicon carbide disperse very well in polymeric matrices when mixed in chaotic mixers. Some examples are presented here. In addition to dispersion, layered silicate clay and carbon nanofibers have been shown to align along the flow direction. The chaotic mixing conditions also cause much less damage to high aspect ratio nanofillers such as carbon nanofibers. In this manner, electrically conductive composites of poly(methyl methacrylate) and carbon nanofibers (CNF) are prepared, which show percolation threshold of approximately 2 wt.% CNF compared to 6 wt.% for materials prepared in an internal mixer under comparable conditions of mean shear rate. Nanofibers are pulled out of the bundles and oriented along the flow directions to produce electrically conductive networks. The same was observed in the mixing of treated carbon nanofibers with polyurethanes.



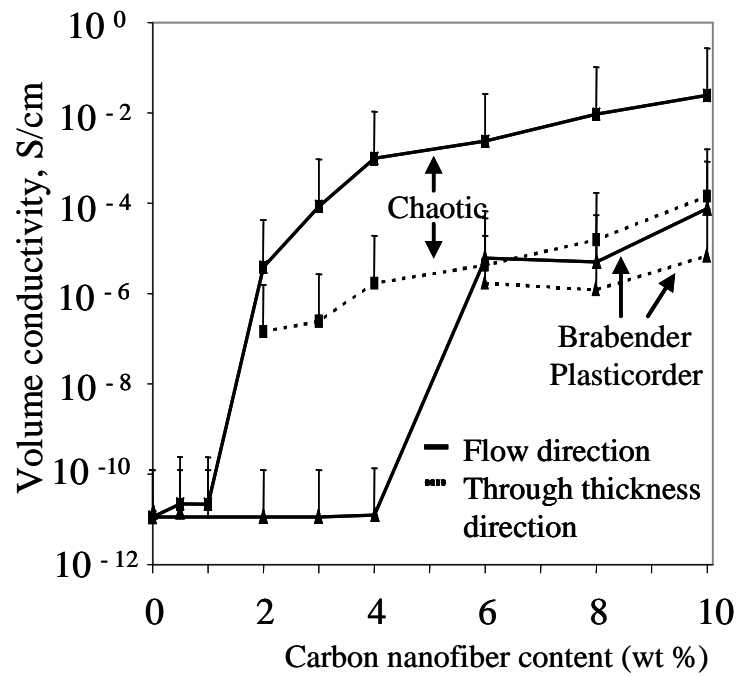
Chaotic mixing-induced orientation of layered silicate clay in bisphenol A polycarbonate (Jana, unpublished work).



Chaotic mixing-induced orientation of carbon nanofibers in polymethylmethacrylate (*Composites Part A: Appl. Sci. Manu.*, 38, 983-993.)

Publications:

1. Jimenez, G., Jana, S.C., 2007 Polymer composites of oxidized carbon nanofibers prepared by chaotic mixing. *Carbon* 45(10), 2079-2091.
2. Jimenez, G., Jana, S.C., 2007 Electrically conductive polymer nanocomposites of polymethylmethacrylate and carbon nanofibers prepared by chaotic mixing. *Composites Part A: Appl. Sci. Manu.*, 38, 983-993.
3. Jimenez, G., Jana, S.C. 2007 Polyurethane-carbon nanofiber composites for shape memory effects. SPE ANTEC 65, 18-22.
4. Jimenez, G., Jana, S.C., 2006, Polymer composites of modified carbon nanofibers prepared by chaotic mixing, SPE ANTEC 64, 352-356.
5. Jimenez, G., Jana, S.C., 2005 Preparation of poly(methylmethacrylate) and carbon nanofiber composites by chaotic mixing. SPE ANTEC 63, 1938-1942.



Volume electrical conductivity of PMMA/CNF composites. Results from materials mixed in chaotic mixer and Brabender Plasticorder are identified. (*Composites Part A: Appl. Sci. Manu.*, 38, 983-993.)