

Antimicrobial Polymers and Nano-clay Delivery Systems

Prof. Lon J. Mathias

***School of Polymers and High Performance Materials
University of Southern Mississippi***

We are currently exploring a variety of new methods of delivery of antimicrobial agents and activities to surfaces and solid materials. Polymer-bound antimicrobials have been reported in the literature, mostly consisting of quaternary ammonium derivatives of polymers. We have developed a number of new monomers and studied their homo- and copolymers as active agents in both biostatic and biocidal applications against model Gram positive and Gram negative bacteria. In addition, known antibiotic drugs have been bound to some of these polymers and evaluated for activity. Extension of this work to nanocomposite delivery systems involves treating clay with various salts of silver and quaternary ammonium compounds. The clays used range from montmorillonite and mica to laponite, one of smallest aspect ratio clays available. In a novel modification process of the clays, we have demonstrated both surface (ionic) and edge (covalent) binding and property modification that open up opportunities for improved compatibility and enhanced activity. Good to excellent antimicrobial activities were found for many of these systems, demonstrating the potential of this approach for making inherently "healthy" surfaces, coatings and polymer-based materials.