



# Polymer Nanocomposites for Packaging Applications



Polymer nanocomposite technology refers to the dispersion of high aspect ratio gas-impermeable silicate or natural clays in a polymer matrix. This technology is being investigated to improve barrier, mechanical and thermal non-foil properties of food packaging films.

## Why Is It Needed?

There is a need to develop a high barrier, non-foil material for ration component packaging systems. Current polymeric materials do not provide sufficient barrier properties to satisfy military requirements. Nanocomposite films are being investigated to improve both barrier and mechanical properties. The development of environmentally friendly, non-foil packaging and the evolution of improved packaging concepts will significantly reduce the amount of solid waste, improve package manufacturing capabilities, and reduce the overall logistics burden (weight and cube of rations) to the Warfighter.

## Technology:

High barrier, non-foil materials are being engineered for ration packaging systems with improved barrier properties and package survivability through the incorporation of nano-clay particles into thermoplastic resins. The surface of these nanoparticles is modified in order that it may be incorporated into plastic resins in a nanoscale size — 1 billionth of a meter. This is 1,000 times smaller than conventional additives or composite material fillers.

## Key Features/Benefits:

**Enhanced properties...** Nanocomposites have been shown to yield substantial improvements in mechanical and barrier properties such as tensile modulus, heat distortion temperature, water vapor transmission rate, and oxygen transmission rate. The resulting high barrier polymeric materials will be used to enhance shelf life and survivability of existing ration systems such as the MRE package and the polymeric tray used in the UGR-H&S. In addition, these materials have high potential for dual-use, commercial applications for shelf-stable processed foods.

**Reduced Solid Waste...** the incorporation of nanoparticles will reduce packaging waste by down-gauging films and eliminating excessive materials.

**Improve Manufacturing Capability...** the removal of foil will increase compatibility with horizontal form/fill/seal equipment, which significantly automates the ration assembly process.

## Point of Contact:

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