Center for Advanced Polymer & Composite Engineering (CAPCE)

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Software for Enhancing In-Mold Coating Processes of Plastic and Composite Products

Automotive body panels are one potential use for in-mold coating.

CAPCE research led by Jose Castro has produced new software to enhance in-mold coating processes. The technique of in-mold coating has the potential to revolutionize the coating and paint processing industries because it allows the coatings to be injected under high pressure right inside the mold used, for instance, to create an automotive body panel, rather than having to run the part through long coating production lines that are expensive, energy consuming, and release solvents into the environment. Software developed by the center provides the ability to predict the flow of in-mold coating processes, saving time and money compared to the previous approach. A center member company is paying patent application costs for this technology. Applications extend beyond the automotive industry to include many kinds of plastic and composite products.

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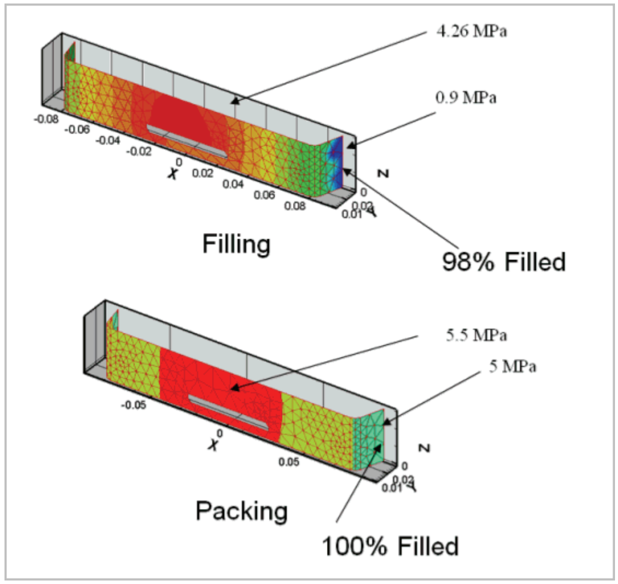
Nanocomposite Foam Breakthrough



Micrograph of polymeric nanocomposite foams. Proper design of the nanoparticle type, content, dispersion, and orientation supports a wide spectrum of foams with well-defined pore structures

The worldwide value of plastic foams was $2 billion in 2000. However, current applications are limited by the fact that foams have poor toughness, strength, and surface quality and low thermal stability, lack fire retardance, and release environmentally-harmful gases. Researchers at Ohio State's I/UCR Center for Advanced Polymer and Composite Engineering (CAPCE) have developed a novel method with the potential to improve foam properties by a factor of 3 or 4. Such improvements are expected to dramatically increase the worldwide demand for plastic foams and increase the U.S. market share in the building and transportation industry, in packaging and as absorbent materials for the health care industry. The method has attracted a great deal of interest from industry and the media. The method involves mixing specially-treated clay nanoparticles with the materials to be foamed, then blowing the foams with carbon dioxide using supercritical fluids technology. The new process for making the foam will have many environmental benefits, including reduced energy use when the material is applied as an insulator in building construction and the elimination of ozone-depleting materials in the foam-making process. In addition, the resulting plastic foam is also fire retardant. Tests with Owens Corning and other companies have demonstrated the feasibility of cost-effective mass production. Scale-up activities for commercialization are being carried out through a $1.9 million NIST-ATP project with Owens Corning and a $2 million equipment award for Low Cost Nanocomposite Foams from State of Ohio Wright Center Capital Project Funds.

> **Economic Impact**: The worldwide value of plastic foams was $2 billion in 2000. This work is expected increase the demand worldwide for higher quality and safer plastic foams and increase the US market share in construction, transportation, and healthcare.

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