



# UNIVERSITY OF TENNESSEE RESEARCH FOUNDATION

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## Energy and Cost Saving Method to Produce Environmentally Friendly Polymeric Foam

### The Technology

Polystyrene foam is used in many applications, from beverage and food containers to insulation for residential and commercial construction. However, the manufacturing process for the foam is energy-intensive and environmentally unfriendly. The source material used for the foam contains an expansion agent, pentane, which is a flammable and toxic gas released into the atmosphere when the material is expanded to create foam. Additionally, today's current manufacturing process requires two applications of heat via steam generation, which is expensive, both from a capital infrastructure and an operational perspective, as well as time-consuming.

Researchers at the University of Tennessee have developed a new method for producing low and high density polymeric foam using a manufacturing technique that greatly reduces the energy, space and equipment required. The method includes a non-toxic, zero-emissions expansion agent that can be recaptured and reused, and also uses microwave (instead of steam) to efficiently heat and expand the foam faster and more efficiently. Additionally, eliminating use of steam allows for use of less expensive and longer-lasting molds for foam products.

### Benefits

- Improves the environment due to new non-toxic expansion agent
- Reduction in infrastructure required: less capital-intensive machinery and less space required for equipment
- Has the potential to significantly decrease manufacturing time
- Saves money: requires less energy and reduces costs for molds
- Opens the door for new applications using polystyrene foam

### The Inventors

**Dr. Dayakar Penumadu** is a Professor in the Department of Civil and Environmental Engineering at the University of Tennessee. He currently holds the Joint Institute for Advanced Materials (JIAM) Chair of Excellence position, joint with Oak Ridge National Laboratory. His focus is on multidisciplinary research in the area of functional materials for infrastructure. He has published extensively and has had numerous research awards from such agencies as the National Science Foundation, the Office of Naval Research, the Air Force Office of Scientific Research, and the Department of Energy, as well as such corporations as General Motors, Entergy, Xerox, and Corning. **Dr. Indraneel Sen** recently completed his doctoral work under Dr. Penumadu's supervision in Materials Science and Engineering and is currently a post-doctoral research scholar.

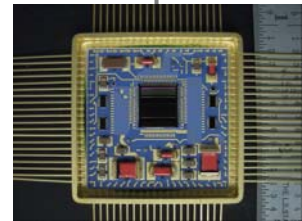
### AGRICULTURE



### BIOTECHNOLOGY



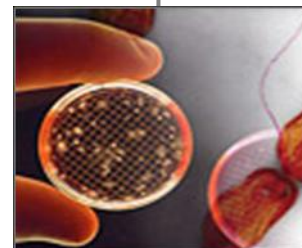
### ENGINEERING



### MATERIALS



### MEDICINE



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## Patents

- One US patent application has been filed.

## Contact

The University of Tennessee Research Foundation (UTRF) is a non-profit corporation responsible for commercializing University of Tennessee technologies and for supporting University research. UTRF is seeking parties interested in learning more about this technology and in exploring possible research and/or commercialization arrangements.

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Reference: PD 06044, 06045, 06064