Bio-composite Panels for Energy Efficient Housing

Investigators:
K. Chandrashekharar (chandra@mst.edu, 573-341-4587), W. E. Showalter, T. Schuman, A. Shabeer, G. Liang, S. Sundararaman

Funding Source:
National Science Foundation, United Soybean Board

Project Description:
The goal of the proposed research is to use bio-based composites for panelized housing construction which will improve durability, energy efficiency, structural performance, fire resistance and affordability of houses. The research will focus on the application of renewable materials to develop core-filled multifunctional composite panels for housing. The following primary tasks will be investigated: Manufacturing of integral core-filled pultruded panels for floor, roof and wall using renewable raw materials; Experimental testing and simulation to evaluate the performance of the core-filled panels; Design of connections for panelized housing construction; Construction of a prototype house and energy efficiency evaluation. High performance panels will be manufactured using an innovative integral core-filled pultrusion process. Soy resin, soy foam and natural fibers will be used as raw materials and will provide better impact resistance and insulation. Glass fibers will be used for outer layer to provide additional stiffness and strength. Nano-silica recovered from rice hull will be added during the pultrusion process to enhance the fire resistance capability of these new materials. The core-filled panels will be tested under different loading and environmental conditions. Experimental results will be compared with finite element solutions.

Publications:
