

Tal Sneh

*Starch Polystyrene: The Bigger Bead the Better?*

New insulation materials are being rapidly developed to better reduce energy loss in buildings. However, many of the common insulation materials are toxic, both to humans and the environment and are not biodegradable. Starch polystyrene has never been investigated as a possibility for insulation, despite the fact that it is a biodegradable and sustainable alternative to current plastic polystyrene. Polystyrene is an excellent insulator because it uses air to suppress conduction and plastic in between air pockets to minimize convection.

Polystyrene is made out of beads, so this project tested optimal bead sizes of starch polystyrene to see which size achieves the lowest heat transfer. Other insulations were tested to see how the starch-polystyrene compared against common insulation materials. To test insulation efficiency, k-value (in Watts per meter per Kelvin) was used. Polystyrene samples were tested in a setup that had two metal blocks on either side of the insulation sample and measured voltage, current, and the temperature of both metal blocks. Using these measurements, k-value was calculated for the materials.

While testing, it was found that some heat did not go through the insulation but instead leaked through other routes. Using fiberglass paper as a control, the heat loss was calculated and subtracted from the power used when calculating k-value. In summary, this project demonstrated that as bead size increases, the insulating efficiency of starch polystyrene increases. The results of this project contributed to the possible development of a starch-polystyrene building insulation that can be biodegradable, inexpensive, and efficient.