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Recyclable Wood Foam Provides Better Insulation than Conventional Foam

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A research team from the [Fraunhofer Institute](#) for Wood Research, Wilhelm-Klauditz-Institut, WKI in Braunschweig have developed a new method of producing foam using wood particles.



These rigid foam insulation boards are 100% wood-based (Credit - Manuela Lingnau / Fraunhofer WKI)
Foam materials are light, inexpensive insulating materials used for preventing damage to fragile goods at the time of shipping, insulating buildings and developing lightweight structures.

These materials are, however, not eco-friendly as they are obtained from natural gas or petroleum. Considering the long run, it is necessary to replace these petroleum-based products with materials derived from renewable resources.

The new foam material produced from wood is recyclable and environment-friendly. Over the years, wood foam could potentially substitute the traditional materials used for lightweight construction, packaging and thermal insulation.

"Our wood foam can be used in exactly the same way as conventional plastic foams, but is an entirely natural product made from sustainable raw materials," explained Professor Volker Thole, department head for process technology and system technology for wood-based materials at Fraunhofer WKI.

Another benefit of wood foam which cannot be applied in other traditional foam products is its recyclability. For example, wood foam that is used as a packaging material can be simply thrown in the recycling bin for reuse. For all these benefits, the new material has received the 2015 GreenTec Award under the "Construction and Living" category.



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The foam is produced by finely grinding wood until all small wood particles turn into a viscous mass. The finely ground wood suspension is then converted into a frothy foam with the introduction of gas, and then the mixture is allowed to harden. The presence of natural substances in the wood aids the hardening process. The new manufacturing method involves specific chemical processes.

Thole explained, "it's similar to the way dough rises and sets when bread is baked in an oven". The resulting wood foam is light in weight, and it can be made into flexible sheets or rigid boards. Further, the foam can be easily cut or sawed to a specific dimension, like any other wood products.

Wood foam is suitable for insulating home as it is capable of maintaining internal heat and providing a warm environment for the occupants. The plastic foam products produced until now have been derived from petrochemical products. Few alternate wood insulation materials like wood-fiber wool or wood-fiber sheets exist, but they are more susceptible to deformation than foam plastic insulation products.

"Thin sheets of fiber insulation have a tendency to gradually collapse under their own weight due to the accumulation of moisture, especially in the middle. This adversely affects their insulating properties," said Thole.

However, the wood foam is comparatively good in this aspect.

"We analyzed our foam products in accordance with the applicable standards for insulation materials and obtained very promising results, not only in terms of their thermal insulation properties but also with respect to their mechanical and hydrodynamic properties," reported Thole.

Thus it can be concluded that wood foam has good resistance to humidity and pressure, and excellent insulation similar to that of conventional plastic foams.

The researchers are now working on different wood samples to identify the suitable tree species that provides the best raw material for insulation application. Future work involves the determination of suitable mass-production methods on an industrial level. The wood foam is likely to be commercialized in the next few years.

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