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Ceramicrete® and Grancrete®

In 1996, Argonne National Laboratory scientists developed a material that they named Ceramicrete. The name blends the words "ceramics" and "concrete" together, and the material has the physical and chemical properties of a ceramic even though it is produced using a mixing process very similar to that used to produce concrete. Basically, mixing magnesium oxide, phosphate powder and water forms Ceramicrete. Just iike concrete, the resulting slurry can be formed by hand, sprayed or pumped into forms.

Technologists developed Ceramicrete specifically for its nonporous, highly compressible, heat-resistant characteristics. It was originally intended as an encasement for nuclear waste. Testing has shown that even over time radioactive contaminants won't leach from a Ceramicrete encasement.

Ceramicrete hardens at a wide range of temperatures (balmy to frigid), and its exact formula can be tweaked to control hardening time from minutes to hours. Over the years, Argonne has encouraged technology transfer and joint ventures with educational institutions and private companies to broaden the possible uses of Ceramicrete. The material now has a broad range of uses in construction and in the fabrication of building materials. Also, dentists use it as cement for tooth fillings and doctors use it to repair or replace bone tissue in the human body.

In the quest for technology transfer and finding new uses for Ceramicrete, Argonne scientists recently teamed up with the engineers of Casa Grande, L.L.C., to co-develop a new ceramic construction coating for use in affordable housing in very poor areas of the world. The development team named their new construction material Grancrete. In 20(14, Grancrete's outstanding properties earned the team a research and development award. Photo 1 shows a thin layer of Grancrete being sprayed on to a clear panel.

People can make Grancrete using the available materials found in the region where they will build the inexpensive homes. For example, in one region of the world it might contain 50 percent sand or soil and 25 percent ash, with 25 percent Ceramicrete serving as a binder.

Argonne National Laboratories

Photo1—Spraying Grancrete on a panel

To build a Grancrete home, Casa Grande workers spray the slurry onto Styrofoam panels. The Grancrete sticks to the Styrofoam, and when it cures it forms a hard shell that is actually stronger than concrete. With just two days of training, a five-member team of local workers can build a house in just one day. They start by forming Styrofoam panels into walls and ceilings. As they complete each wall they spray Grancrete over the Styrofoam. This converts the foam into a vpry strong, fire-resistant and extremely well insulated construction element. Photo 2 shows a Grancrete home under construction.

When used as a binder in Grancrete, Ceramicrete doesn't retain all of the characteristics that one would find in the pure form used to construct nuclear waste encasements. Argonne National Laboratory reports that when used as a binder with indigenous materials, Grancrete may break down over time. Still, the good news is that if structures that use Grancrete decompose over a period of decades, the Grancrete is biodegradable.

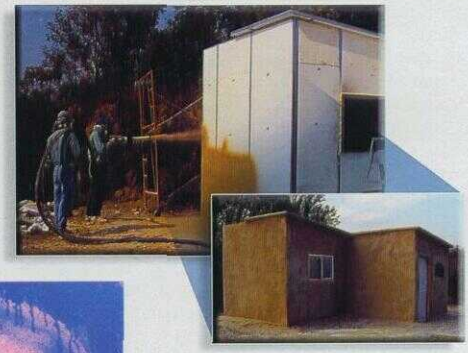

Photo 2—Construction of a Grancrete home

Grancrete is now in final testing, and Argonne and Casa Grande, L.L.C., hope to make the material available worldwide very soon. You can learn more about these materials by Googling Ceramicrete and Grancrete.

Recalling the Facts

1. For what purpose was Ceramicrete originally developed?
2. Grancrete isn't as strong as Ceramicrete. Why?
3. Do you think Habitat for Humanity would take interest in Grancrete? Why? ®

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