

Emerging Building technologies in Ceramics

by Jason Oliver Vollen

Abstract

The new field of emerging material technologies seeks to radically change the nature of available building products. By incorporating new materials and methods of production into development of existing technologies this proposal will produce, test, evaluate and install reinforced terracotta tile building envelopes that are environmentally advantageous in their ability to cool and heat buildings at appropriate times.

To be of significant value a new product for the building industry must be energy efficient, utilize abundant or recyclable materials and must encourage local economic development through appropriate available technologies. Terracotta meets these requirements yet in order to reintroduce architectural ceramics to the construction industry, traditional terracotta must be reinvented as a composite material in the new field of Emerging Building Technologies. Two recent classifications of materials, Recombinant and Multidimensional, have advantages as products for building construction. Recombinant materials are composites assembled with two or more distinct materials whose intrinsic properties work in unison to create a singular material with enhanced properties. A recombinant building product can significantly increase the efficiency of the construction process by reducing the amount of required parts in the building envelope. Multidimensional materials create geometric depth through the development of high relief, an innovative aspect of our manufacturing process. We predict that these materials will have more structural stability, more surface area for energy dissipation, and better sound absorption through variation in surface texture and depth of relief.

The research involves development, testing and prototyping of reinforced ceramic composite building panels and will produce a demonstration shelter on the University of Arizona campus that will attract industry and other funding sources. The funding of this project will research content for the new Graduate Program in Emerging Materials Technology in the University of Arizona School of Architecture, while fostering interdisciplinary research between the School of Architecture and the Department of Materials Science and Engineering with applications in the School of Art programs in ceramics and sculpture.