

# MCX



## Member Communication Experience

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The third domain of organic life are Eukarya. Only four kingdoms will be mentioned here: fungus, slime molds, plants, and animals. Fungus already appears in building materials and holds future promise in green construction. Slime mold has demonstrated its ability in some simple computer problems and in solving route optimization problems.

Plant-based materials have long been used in construction. Now, when combined with other organics and inorganics, new uses are being found. Two examples are (1) increased use of bamboo in construction scaffolding worldwide and (2) translucent wood used in lieu of glass windows providing greater strength while being biodegradable.

The final kingdom is the animal kingdom, of which humans are a part.

## Inorganic

Inorganic is the world of materials the E&C industry has traditionally transformed with purpose throughout history. It is where machines, processes, knowledge, and insight are applied. The materials available have transformed, opening up new solutions and technologies not previously available. Many of the new technologies originate in other industries, increasingly without immediate adjacency. This should encourage the industry to scan more broadly in search for improvements, innovations, and new technologies that can be extended into construction.

The materials available to the E&C industry can be grouped into four broad categories:

1. Naturally occurring; natural scale – iron, copper, aluminum and for simplicity even common carbon steels. Organic building materials such as wood could be included.
2. Synthesized; change of state – This is typically the result of a physical, chemical, electromagnetic, or irradiation process. It is also the result of the combination of materials, both organic and inorganic. (Later, this category will be subdivided and feature interesting examples of emerging E&C technologies; historical examples include concrete, stainless steel, and permanent magnets).
3. Nanomaterials – Advances in this area range from the creation of classes of physical materials with designer properties to further advances in bioengineering, creating designer organisms. Importantly, the technologies to advance the application of nanotechnology at scale are becoming more widely available. Table 1 highlights some nanomaterial applications.





Figure 1

Example #1 - E-WEBBINGS®: Woven narrow-fabrics that are conductive, enabling the electronic transmission of data, sensations (light, noise, vibrations, heat), and power that can be stored or used to actuate/transform objects. These unique conductive fibers can be woven in conjunction with other fibers and used in embedded sensors in both wearable and integral technology, including the Internet of Things. (Figure 1, upper left)

Example #2 - TPCM fabrics are comprised of structural and matrix/resin fibers oriented to maximize X, Y and/or Z directional properties. They can produce lighter-weight, quality parts at reduced materials and labor costs, with reduced process complexity and bills of material. Potential fiber combinations include a varied mix of structural yarns and matrix/resin yarns.

TPCM in a customi







Figure 2 Construction Robots

### In Closing

Tomorrow's breakthroughs will occur at the intersection of energy, organic and inorganic materials, transformed E&C processes, information, and changed frames of reference. AI will be an enabler and an important technology that will open up new innovations but it will not be the only one. Challenge current paradigms, engage a diversity of thought, and start with the right questions. The E&C industry's potential is only limited by