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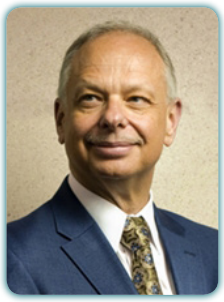

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Small things offer big promise

The ability to use machines to manipulate matter at a time renders many things possible that were impossible before. Living systems do this on a regular basis. The core challenge to access life function is transforming the labile molecules that exist in a fragile living organism into a stable engineered system that is economically scalable. The most significant difficulties revolve around environmental stability and the inherent structural limitations of these molecules. The solution to these difficulties is at hand. The generic solution methodology used to solve these limiting challenges to produce a new class of materials and devices is presented. By introducing "metabolism" into engineered devices and materials, solutions to grand societal challenges in medicine, environment and agriculture now appear to be attainable. Furthermore this new technology does not rely on $100's of millions of infrastructure making it globally assessable to developing nations. It offers a global promise of economic opportunity and prosperity. Exemplars of the application of this new technology will be shown. We will elucidate the design, engineering and assembly of a complex closed system that uses a highly modified photosynthetic process to transform carbon waste into valuable drop-in specialty chemicals and is enabled by the synthesis of a new class of printable "inks" that have stabilized active biological molecules as integrated elements of synthesized polymer constructs. We will present a technology that transitions additive manufacturing from 3D space to a four-dimensional, functional space creating a whole new class of materials and devices. The application of this technology to medicine, in particular the treatment of type 1 diabetes, glaucoma and other medical conditions will also be illustrated.

Biography

C D Montemagno is the former and founding Dean of the College of Engineering and Applied Science at the University of Cincinnati. He was the Chair of the Department of Bioengineering and Associate Director of the California NanoSystems Institute as well as the Roy & Carol Doumani Professor of Biomedical Engineering at UCLA. He was an Associate Professor in the Department of Biological and Environmental Engineering at Cornell University. He completed his BS in Agricultural and Biological Engineering from Cornell (1980), MS in Petroleum and Natural Gas Engineering from Penn State University (1990) and PhD in Civil Engineering and Geological Sciences from Notre Dame University. He is a Fellow of the American Academy of Nanomedicine, a Fellow of the American Institute for Medical and Biological Engineering and a Fellow of the NASA Institute of Advanced Concepts.

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