ADDITIVE MANUFACTURING OF ELASTOMER, CERAMIC AND METAL MULTI-FUNCTIONAL STRUCTURES

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Key Words: multi-functional structures.

3D printing has been historically relegated to fabricating conceptual models and prototypes; however, increasingly, research is now focusing on fabricating functional end-use products. As patents for 3D printing expire, new low-cost desktop systems are being adopted more widely and this trend is leading to a diversity of new products, processes and available materials. However, currently the technology is generally confined to fabricating single material static structures. For additively manufactured products to be economically meaningful, additional functionalities are required to be incorporated in terms of electronic, electromechanical, electromagnetic, thermodynamic, chemical and optical content. By interrupting the 3D printing and employing complementary manufacturing processes, additional functional content can be included in mass-customized structures. This presentation will review work in multi-process 3D printing for creating structures with consumer-anatomy-specific wearable electronics, electromechanical actuation, electromagnetics, propulsion, embedded sensors in soft tooling and including metal and ceramic structures.

Other projects to be presented include stereovision process monitoring of powder bed fusion, 3D printed smart molds for sand casting, complex ceramic lattices for electromagnetic lenses, elastomeric lattices for the athletic gear, computation geometry and complexity theory for 3D printing.