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4D Programmed Stimuli-Responsive Structural Reinforcement

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5b. GRANT NUMBER
FA9550-16-1-0307

5c. PROGRAM ELEMENT NUMBER
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6. AUTHOR(S)
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5d. PROJECT NUMBER

5e. TASK NUMBER

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8. PERFORMING ORGANIZATION REPORT NUMBER

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13. SUPPLEMENTARY NOTES

14. ABSTRACT
No Final Technical Report was obtained for grant number FA9550-16-1-0307. I attempted to reach the Principal Investigator (PI) to obtain the Final Technical Report on 12 Sep 2016, 23 Mar 2018, 3 Aug 2018, and 20 Mar 2019. In addition, AFOSR STINFO tried on 20 Mar 2018. All attempts were unsuccessful. The research proposed was to provide scientific basis for 4D programmed reinforcement employing ultrasonic manipulation and active matrices within 3D printing for designed simultaneous deformation and reconfiguration. A 4D material responds to a physical or chemical change of state through time. The work was primarily experimental with supporting numerical components. The objectives were: a. Develop a multi-pattern ultrasonic device capable of manipulating, aligning, and switching between different fibrous constructs during 3D additive manufacturing. b. Create 4D polymer matrices (hydrogel and liquid crystal based) for 3D printing. c. Develop a new 3D ALM technique that harnessed in-situ multi-patterned ultrasonic manipulation of fibrous constructs within a 4D matrix for triggered time-dependent deployment of composite architectures. d. Obtain mechanical and physical characterization of the 4D fibrous constructs and matrix materials including evaluation of rate of deployment, blocking force, and global stiffness-strain response for different geometrical configurations. e. Demonstrate a proof of concept.

15. SUBJECT TERMS
EOARD, Composites, 4D printing, stimuli-responsive

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