Smart Materials and Structures

Research in this area is mainly related to modeling, production, characterization, and application of thermal and ferromagnetic shape memory alloys (SMAs), as well as shape memory polymers (SMP). Various kinds of static and dynamic electro-thermo-mechanical loadings and the corresponding responses for different configurations of SMA components have been investigated to be utilized in innovative, smart systems. Shape setting techniques are also required to produce shape memory alloys in any desired form with predefined characteristics. Current focus is on energy harvesting using SMA elements of different geometries.

Research on 3D/4D printing have been related to modeling and finite element simulation of additively manufactured parts made of polymers or SMAs, as well as 4D printing of polymeric and metallic shape memory materials, to produce smart parts with customized characteristics and to predict mechanical behavior of the products in response to different stimuli. Current research is on functionally graded cellular structures.

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