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Numerical simulation and experimental study of the compressive energy absorption characteristics of a multi-layered gradient Egg-box structure

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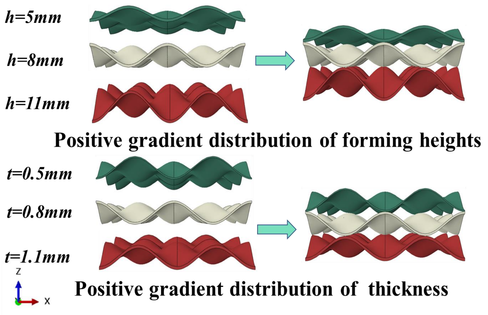
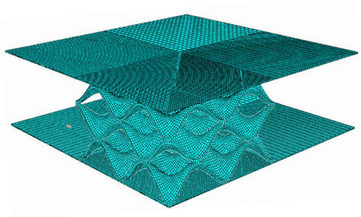
Abstract: In this study, a method for constructing multilayer gradient egg-box structures is described, followed by numerical simulations and experiments to investigate the influence of sheet **thickness gradients** and **forming height gradients** on the energy absorption of **multilayer egg-box structures.** The results show that **the multilayer gradient egg-box structure can form multiple energy absorbing platforms and has a better energy absorption capacity per unit mass in compression.**

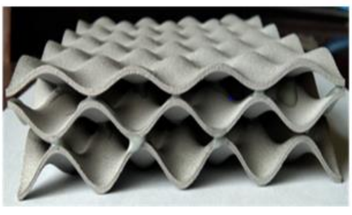
Research Process:

1 Establishment and Simulation of multi-layer gradient egg-box structures

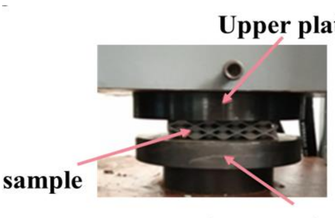




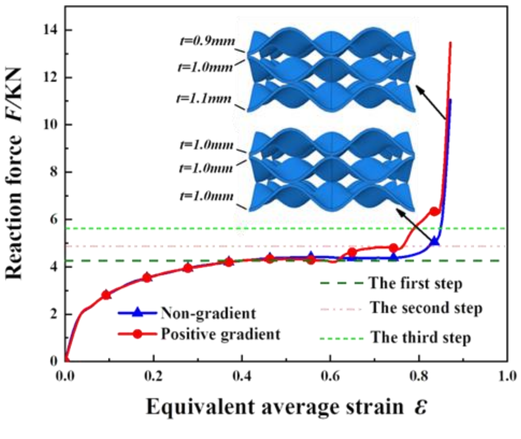
2 Compression experiment verification

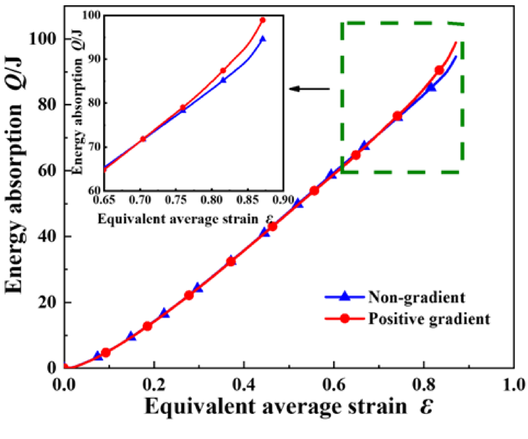


Samples obtained by 3D printing



3 Analysis and summary of results





Taking the multi-layer egg-box structure with thickness gradient distribution as an example, it can be seen from the curve that there are three energy absorption steps during the compression process, unlike the multilayer egg-box structure without gradient, **the gradient egg-box structure can form multiple energy-absorbing platforms and thus has the property of graded stiffness.**