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Controlling material reactivity using architecture.[1]

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The reactivity of thermites can be tailored through selection of several parameters, and can range from very slow burns to rapid deflagrations. 3D printing is a rapidly emerging field, and offers the potential to build architected parts. Here we sought to explore whether controlling such features could be a suitable path forward for gaining additional control of the reactivity. This talk discusses several new methods for preparing thermite samples with controlled architectures using 3D printing. Additionally, we demonstrate that the architecture can play a role in the reactivity of an object. Our results suggest that architecture can be used to tailor the convective and/or advective energy transport during a deflagration, thus enhancing or retarding the reaction. The results are promising in that they give researchers an additional way of controlling the energy release rate without defaulting to the conventional approach of changing the formulation.

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