

## Freeform Fabrication of Intermetallics By Reactive Rapid Prototyping

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A novel freeform fabrication method for intermetallics named Reactive Rapid Prototyping (RRP) was demonstrated in the creation of simple 3D structures of nickel aluminide. The RRP is a combined process of self-propagating high-temperature synthesis (SHS) and rapid prototyping. When small droplets of molten aluminum were ejected onto the nickel powder bed on the moving x-y-z stage, hot nickel aluminide beads were formed by SHS and simultaneously joined, eventually building up a 3D object. The RRP was systematically controlled by a computer. The temperature of the aluminum droplets and the addition of reaction controllable agents governed the formation and joining of the beads. The microstructure of a bead became homogeneous when the ejection temperature exceeded 1000°C. The joinings between adjacent beads and between layers were successfully performed without the formation of cracks and pores.