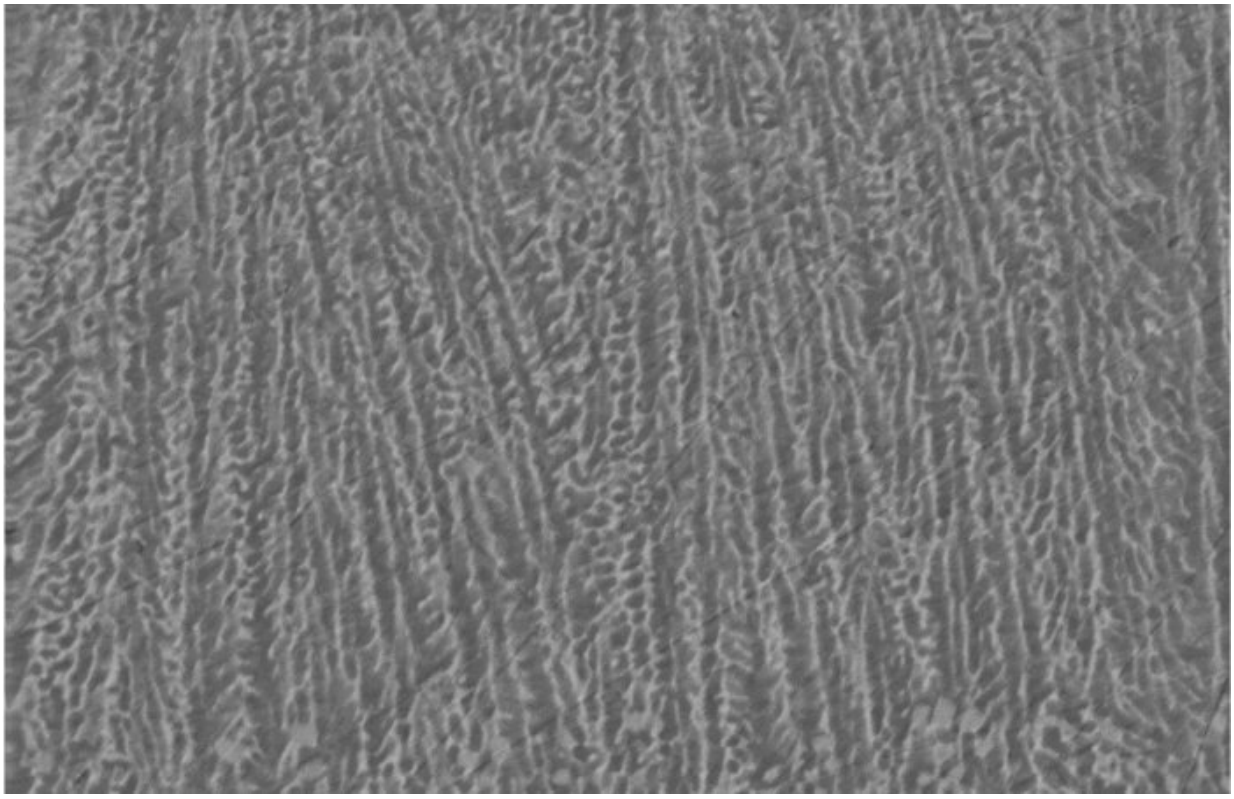
Researchers 3D print a lightweight aluminum-and-cerium-based alloy

November 2 2021, by Jennifer J Burke



ORNL researchers used a laser power bed manufacturing technique to 3D print a lightweight aluminum and cerium-based alloy that can withstand temperatures up to 300 degrees Celsius, proving high strength and durability for automotive, aerospace and defense applications. Credit: ORNL, U.S. Dept. of Energy

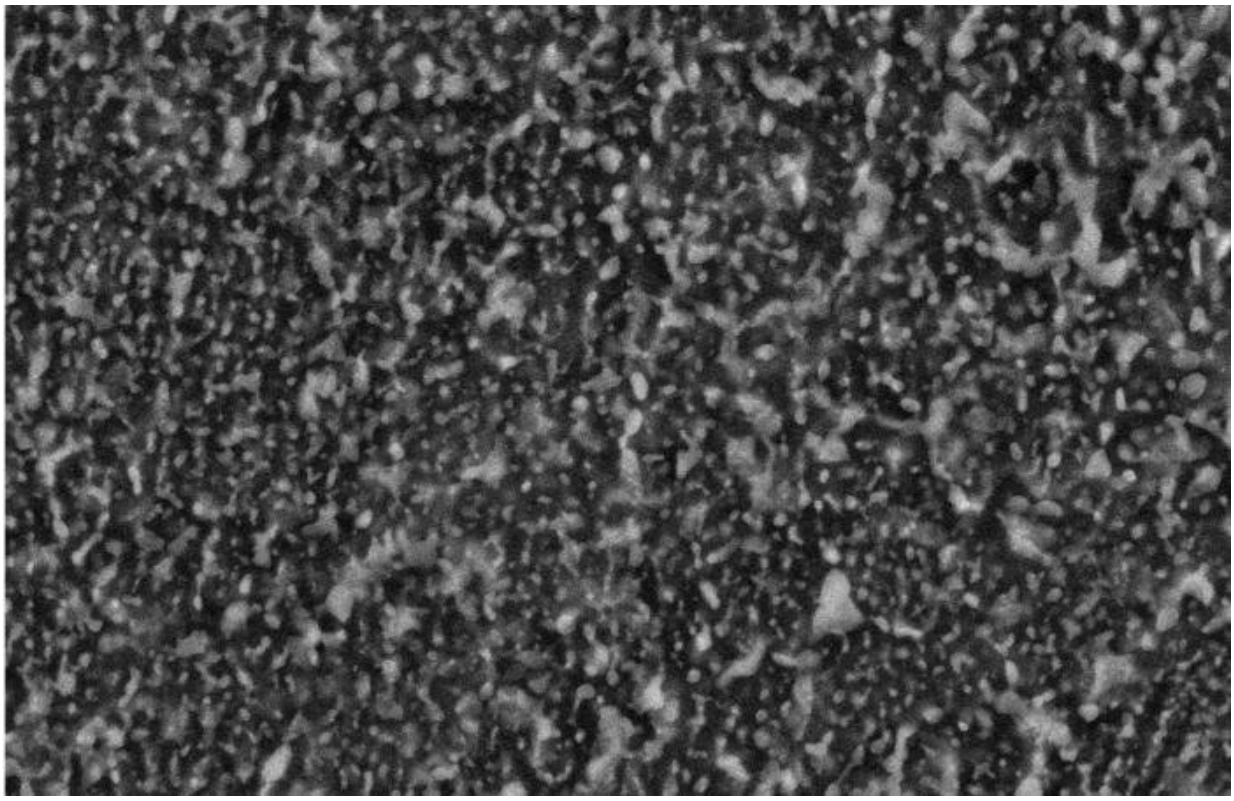
Oak Ridge National Laboratory researchers have additively

manufactured a lightweight aluminum alloy and demonstrated its ability to resist creep or deformation at 300 degrees Celsius.

Materials that can perform under high pressure, high temperature environments are needed for automotive, aerospace, defense and space applications. The alloy, which combines aluminum with cerium and other metals, was printed using a laser powder bed system that deposits one thin layer of material at a time for precise results. Researchers printed pistons made of the alloy for deployment inside of a full-scale engine.

"Using powder-bed 3D printing allowed the alloy to rapidly solidify into fine, stable strengthening particles in the microstructure, resulting in the remarkable high-temp creep resistance we measured," ORNL's Ryan Dehoff said. "We expected notable improvements, but were surprised by how strong and stable these alloys proved to be."

The pistons will undergo additional testing inside of a four-cylinder, turbocharged engine.



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Provided by Oak Ridge National Laboratory