

Researchers 3D print a lightweight aluminumand-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 <u>high pressure</u>, high temperature environments are needed for automotive, aerospace, defense and space applications. The alloy, which combines aluminum with <u>cerium</u> 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 <u>alloys</u> 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

Citation: Researchers 3D print a lightweight aluminum-and-cerium-based alloy (2021, November 2) retrieved 27 June 2024 from <u>https://phys.org/news/2021-11-3d-lightweight-aluminum-and-cerium-based-alloy.html</u>

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