A more durable material for the power industry

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New research published in *Nature* is challenging a theory that is more than 50 years old and could change how some materials are designed in the future.

A team of researchers, including Rajiv Mishra, professor of materials science and engineering, and post-doctoral researcher Mageshwari Komarasamy of UNT's College of Engineering, did experimental research regarding creep deformation theory. That theory suggests all solids are to some extent subject to a slow, continuous deformation under constant stress. However, these researchers developed a divergent alloy that is able to achieve and retain high strength and creep resistance even at high temperatures.

"Nanocrystalline alloys are inherently unstable at high temperature, but we found a way to get them stable and that is a major breakthrough," says Mishra, who directs UNT's Advanced Materials and Manufacturing Processes Institute. "These results will have a profound impact on how materials are designed for high-temperature applications such as power plants and engines."

Part of this breakthrough comes from using elements that typically don't mix, similar to oil and water, so they have rarely been used in the past. However, this research team processed metallic alloy containing elements that do not mix and in turn found that such alloys are inherently more stable at high temperatures.

Now that they have made this breakthrough finding, the UNT research team, along with researchers from Army Research Lab and Arizona State University, is exploring new ways of creating similar systems with extraordinary performance.

More information: Jonathan Cormier. Materials science: Not so creepy under stress, *Nature* (2016). DOI: 10.1038/537315a

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