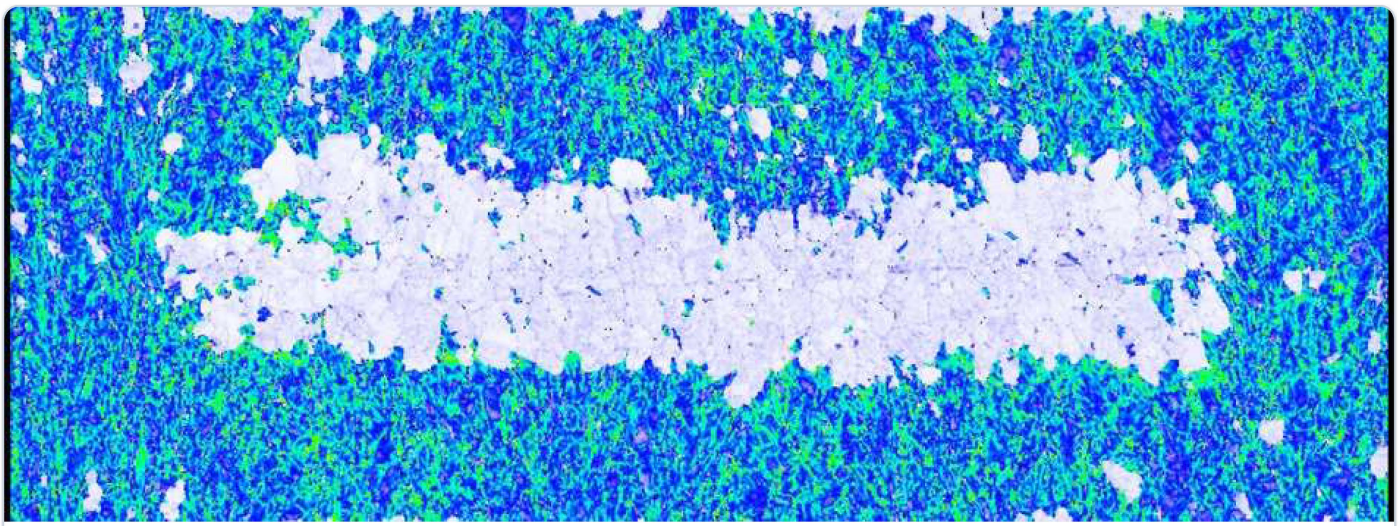

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3D-printed metals with contrasting properties made using new method

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Scientists have developed a new method that can make customized 3D-printed metal parts containing different properties—such as having some regions of the metal stronger than others.

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A scanning electron microscope photo of a stainless steel part 3D printed using the new method developed by NTU Singapore and the University of Cambridge. The white regions of the metal part are mechanically weak, while the blue-green regions are strong. Credit: NTU Singapore

The new technique from the researchers—led by Nanyang Technological University, Singapore (NTU Singapore) and University of Cambridge—uses 3D-printing steps.

Unlike traditional metal manufacturing processes, it does not require additional raw materials, mechanical treatment or drastic machining processes to achieve a similar effect, such as coating the metal with a different material, thus potentially helping to reduce manufacturing costs.

Besides designing a 3D-printed metal part with different strength levels, the new process should theoretically also allow manufacturers to design a part with other features, such as differing levels of electrical conductivity or corrosion resistance in the same metal.

The researchers—co-led by Professor Gao Huajian, a Distinguished University Professor at NTU Singapore, and Assistant Professor Matteo Seita from the University of Cambridge, who was an NTU faculty when the study was done—took inspiration from "heating and beating" methods similar to millennia-old steps involved in blacksmithing to develop the new process.

This led them to combine materials science and mechanical engineering principles and apply 3D-printing techniques usually used to remove and prevent defects in printed metals to alter microscopic structures in the metals to change their properties.

The novel method also lets manufacturers decide the type of internal microstructure they want—and thus the type of property—and where precisely it can be formed in the metal. This improves on traditional means...

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