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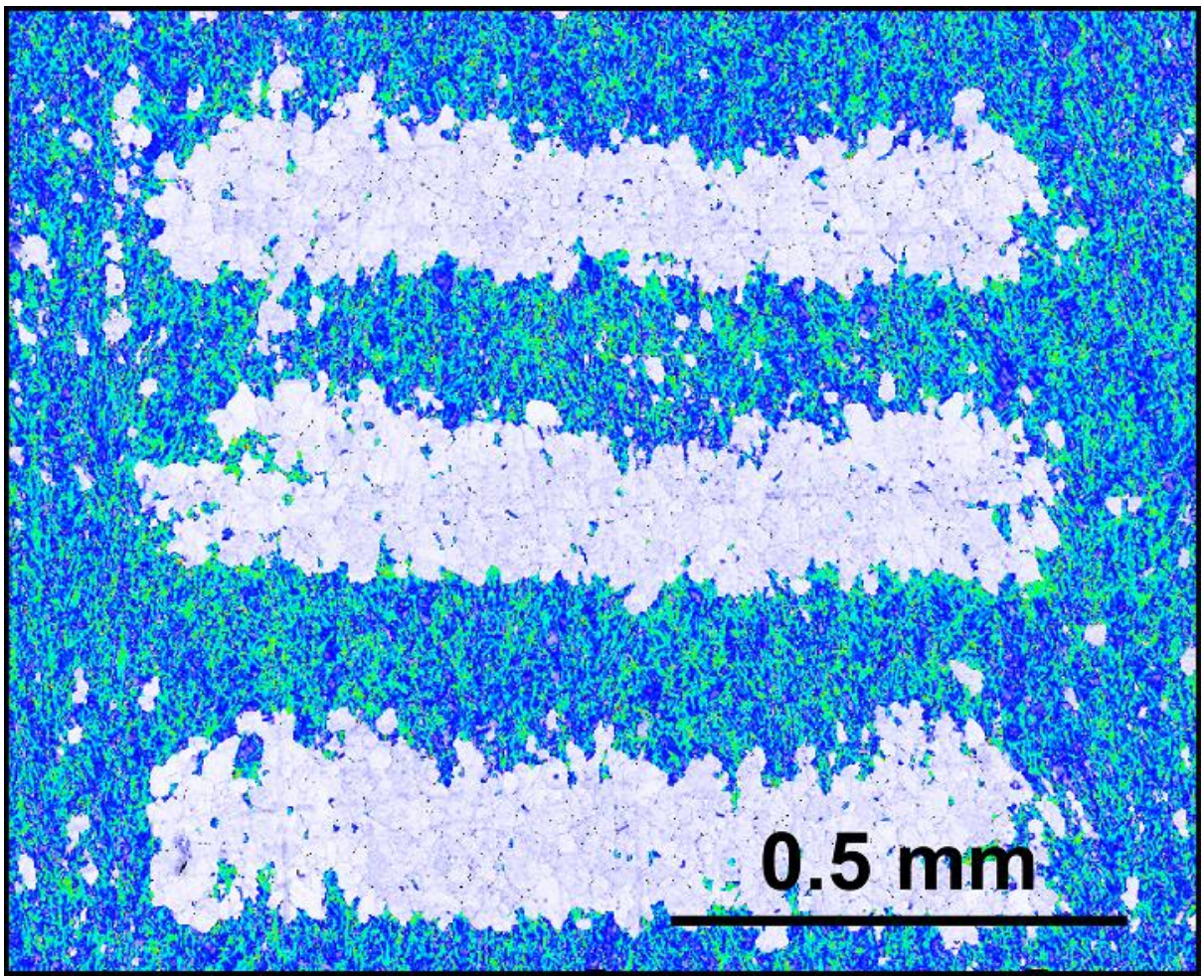
Researchers 3D Printing Customized Metal Parts with Different Properties



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)

A team of researchers, led by the University of Cambridge and Nanyang Technological University, Singapore (NTU Singapore), came up with a new

method to make customized 3D printed metal parts with different properties, like having some regions of metal parts stronger than others. Inspired by traditional "heating and beating" methods used in blacksmithing, the interdisciplinary team combined materials science, mechanical engineering principles, and 3D printing techniques normally used to remove and prevent defects in metals, and developed a method that can alter microscopic structures in the metals to change their properties. Additionally, the method makes it possible to decide what type of internal microstructure, and type of property, you want, and where it can be formed in the metal. Theoretically, manufacturers could use this process to design metal parts with features like different levels of corrosion resistance or electrical conductivity. You can learn more in the team's research paper.

"Our method opens the way for designing high-performance metal parts with microstructures that can be finetuned to adjust the parts' mechanical and functional properties, even at specific points, and allowing them to be shaped in complex ways with 3D printing," explained Professor Gao, from NTU's School of Mechanical and Aerospace Engineering (MAE).

Other scientists on the team were from the Agency for Science, Technology and Research (A*STAR)'s Singapore Institute of Manufacturing Technology (SIMTech); A*STAR's Institute of High Performance Computing (IHPC); Switzerland's Paul Scherrer Institut (PSI); the VTT Technical Research Centre of Finland; and the Australian Nuclear Science and Technology Organisation (ANSTO).

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