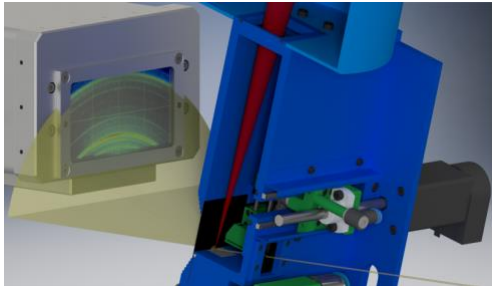


Operando X-ray diffraction during laser 3D printing

Samy Hocine, et. al., *Materials Today* 2019, DOI: <https://doi.org/10.1016/j.mattod.2019.10.001>



Additive manufacturing, a bottom-up approach for manufacturing components layer by layer from a 3D computer model, plays a key role in the so-called “fourth” industrial revolution. Selective laser melting (SLM), one of the more mature additive manufacturing processes, uses a high power-density laser to selectively melt and fuse powders spread layer by layer. The method enables to build near full density functional parts and has viable economic benefits. Despite significant progress in recent years, the relationship between

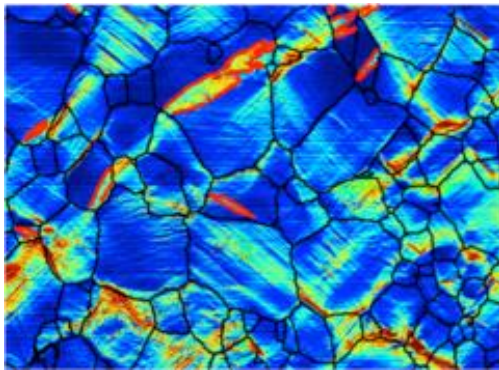
the many processing parameters and final microstructure is not well understood, which strongly limits the number of alloys that can be produced by SLM for commercial applications.

Read more:

<https://www.psi.ch/en/pem/scientific-highlights/operando-x-ray-diffraction-during-laser-3d-printing>

Characterisation of work hardening and springback in Ti

K. Sofinowski, et. al., *Acta Materialia* 181 (2019) 87, DOI: <https://doi.org/10.1016/j.actamat.2019.09.039>



Plastic effects during sheet metal forming can lead to undesirable distortions in formed components. Here, the three-stage work hardening and plastic strain recovery (“springback”) in a cold-rolled, commercially pure titanium is examined. Interrupted standard tensile tests *within situ* x-ray diffraction and quasi-*in situ* electron backscatter diffraction show that twinning plays a minor role in both of these phenomena. The experiments give evidence that the observed work hardening plateau is the result of an abrupt activation and multiplication of $\langle c+a \rangle$ slip and a subsequent redistribution of load between grain families. The springback

can be attributed to inelastic backwards motion and annihilation of dislocations, driven by backstresses from dislocation-based hardening during loading. The peak broadening behavior, observed by x-ray diffraction, suggests that the internal stress state is highest in the rolling direction, resulting in consistently higher springback magnitude along this direction.

Read more: <https://www.psi.ch/de/pem/scientific-highlights-and-news>

Animal embryos evolved before animals

Z. Yin, et. al., *Current Biology* 29, 1-8 (2019), DOI: <https://doi.org/10.1016/j.cub.2019.10.057>



Detailed characterization of cellular structure and development of exceptionally preserved ancient tiny fossils from South China by synchrotron based X-ray tomographic microscopy at TOMCAT led an international team of researchers from the University of Bristol and Nanjing Institute of Geology and Palaeontology to the discovery that animal-like embryos evolved long before the first animals appear in the fossil record.

Read more: <https://www.psi.ch/en/x-ray-tomography-group/scientific-highlights-and-news>