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## In operando X-ray diffraction during laser 3D printing

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Selective Laser Melting (SLM) is a well-known process category in Additive Manufacturing in which thermal energy selectively fuses regions of a powder bed. To investigate process parameters for metallic materials in-situ with synchroton X-rays, a miniaturized SLM device has been developped at PSI. The design of the miniaturized SLM device is determined by the requirements for X-ray access and implementability at different beamlines of synchrotron light sources. First in situ X-ray diffraction tests were performed successfully on Ti-6Al-4V samples at the MicroXAS and MS beamlines, located at the Swiss Light Source. By varying the laser power, scanning speed and hatch distance, various energy densities are obtained. The dynamics of the alpha and beta phases during fast heating and solidification are tracked with a time resolution of 50ms. This allows investigating the heating and cooling rates, and the size and shape of the heat affected zone.

## Position

Phd

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