Announcement of the project entitled:
Additive Prozess- und Mikrostrukturoptimierung für die Realisierung gewichtsoptimierter, ressourcen-schonender Luftfahrtantriebs-komponenten (Akronym: AMTrieb)

Achieving the desired climate targets (Paris2015, Flightpath2050) new technologies and propulsion concepts (fuel cell propulsion, hydrogen direct combustion, WET Engine) are required. Both the next generation of geared turbofan engines and new propulsion concepts make high demands on materials and design. To ensure that future propulsion concepts can find their way into the mobility of tomorrow in a climate-friendly and at the same time economical way, the development and establishment of a stable, resource-saving process chain for aircraft propulsion components is essential.

The research project, funded by the German Federal Ministry for Economic Affairs and Climate Action involves the project partners GfE Metalle und Materialien GmbH (Nuremberg), Access e.V. (Aachen), Friedrich-Alexander-Universität Erlangen-Nürnberg (Erlangen) and Neue Materialien Fürth GmbH (Fürth). MTU Aero Engines AG (Munich) is supporting the project as an associated partner. In particular, NMF will intensively investigate the method of electron-optical process observation (ELO) for the high-temperature material TiAl. The goal of the ELO application is to provide defect information with the same or even higher resolution compared to conventional X-ray analysis. Potentially, the successful implementation of ELO-based quality assurance can replace the cost-intensive postprocessing via X-ray for additively manufactured aerospace components.

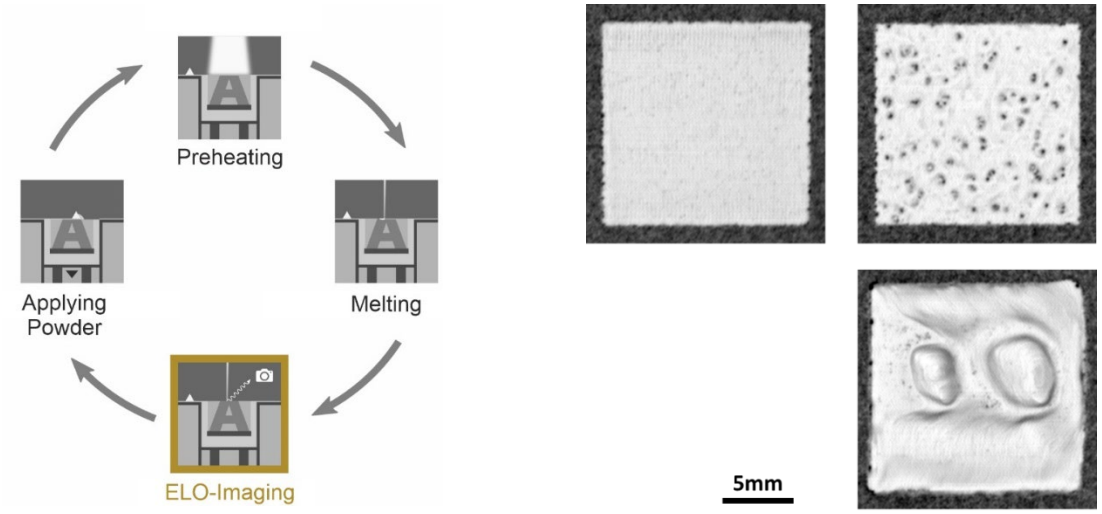

Figure 1: Four-stage additive manufacturing process (left). The ELO detects backscattered electrons and enables robust process monitoring. The example of cubes with an edge length of 15 mm shows the great potential of the ELO. Optimal energy input leads to defect-free samples (center). A low energy input leads to porosity (right, top). A high energy input can provoke the formation of bulges (right, bottom).

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