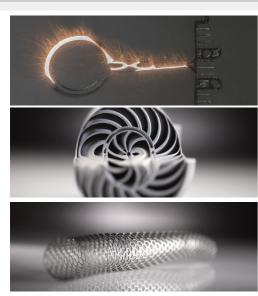


Our group investigates metal additive manufacturing of advanced materials, including Al, Ti, steel, Cu, CoCr, Ta, NiTi, metallic glasses, high entropy alloys and metal matrix composites. We focus on the design, development and fabrication of complex and reliable structures and components with various applications in the biomedical, power and the automotive industries.



Selective laser melting (SLM) fabricated metal components (GE)

#### **More information**

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# Added-value Next-Generation Additive Manufacturing (3D Printing)

Additive Manufacturing and Advanced Materials Group School of Mechanical and Manufacturing Engineering Technologies

Our technologies are the core of our ability to create innovative products for a diverse range of industries. They include

- Design and development of new metallic materials with enhanced
  processability for additive manufacturing
- Novel functionally gradient porous or solid structures with tailorable stress
   state and microstructure for unparalleled properties
- Architecture design and topology optimisation of additive manufactured structures with the aid of finite element modelling for robust performance, multi-functionality and low cost
- Low-cost and effective post-treatment strategies for additive manufactured
   metal components

## Competitive advantage

Existing metallic materials suitable for additive manufacturing are extremely limited and some have poor processability, resulting in the formation of deleterious defects.

- Our innovative machine-learning based design process enables us to quickly develop new metallic materials for additive manufacturing at low cost
- The additive manufacturing process of these newly-designed materials can be optimised more efficiently to minimise the formation of defects
- Following this, functionally gradient porous or solid structures with tailorable microstructure and enhanced properties can be produced

#### Recent research projects

- Additive manufacturing of antimicrobial/antibacterial stainless steel and Ti porous structures for biomedical applications
- Additive manufacturing of high strength and high ductility metal matrix composites/structures for automotive applications

### Facilities and infrastructure

- Metal 3D Printer: Concept Laser Mlab cusing 200 R and ProX DMP 300
- Mechanical Properties: In-situ testing, controlled temperatures and environments, micro-mechanical testing, fatigue and wear
- High resolution microscopy and tomography (SEM, TEM, EBSD, Atom Probe, microXCT, etc.). Probe, microXCT, etc.)

