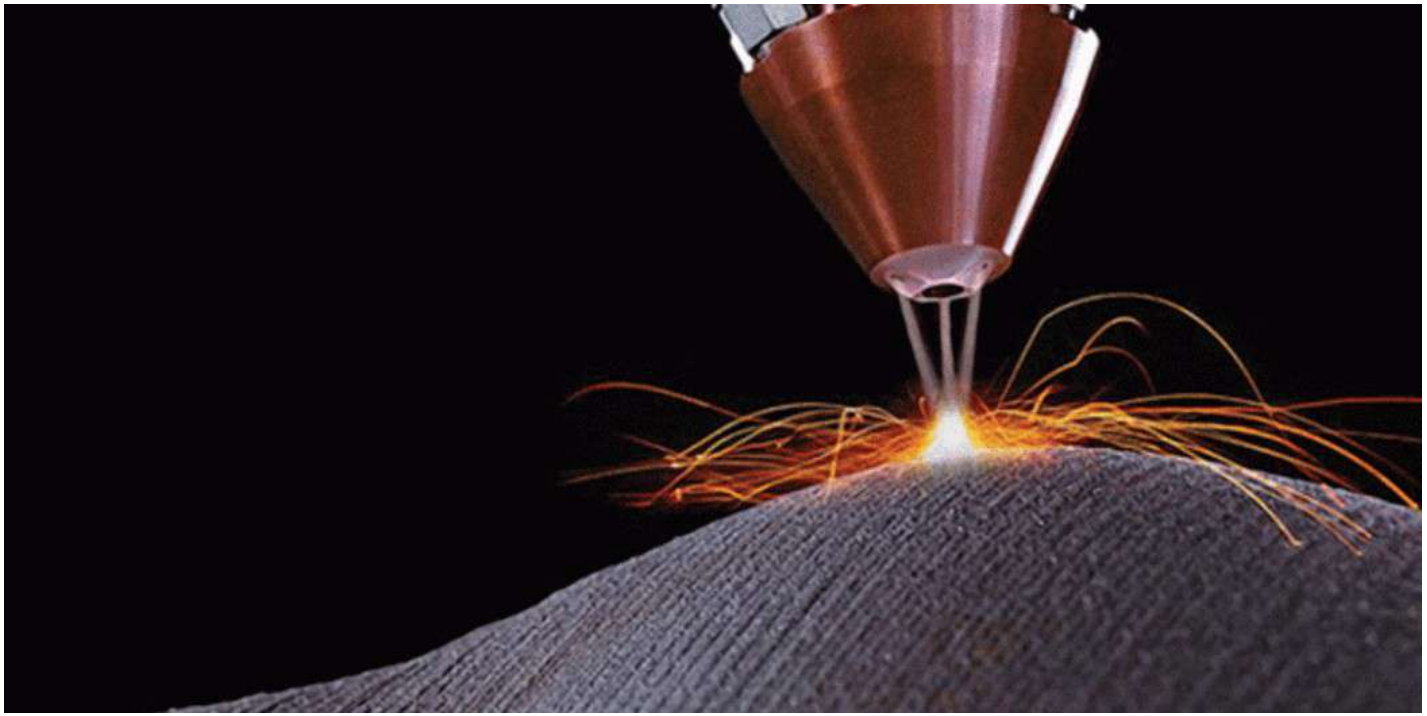
UNIVERSITY OF CAMBRIDGE

Probabilistic neural network design of an alloy for direct laser deposition

Gareth Conduit

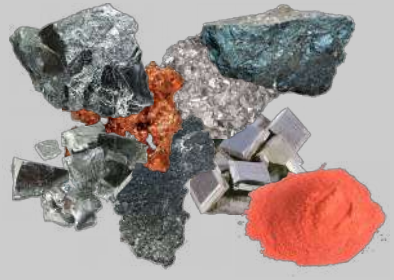
Theory of Condensed Matter group

Direct laser deposition requires new alloys



Neural networks for materials design

Composition



Properties

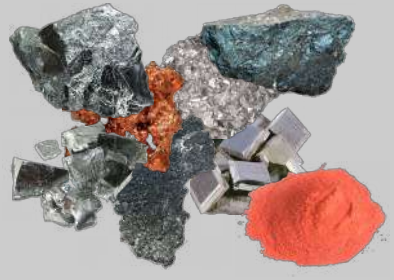
Process

Fatigue

Welding

Neural networks for materials design

Composition



Properties

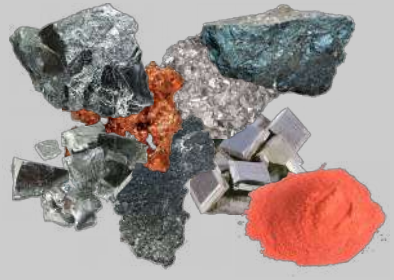
Process

Fatigue

Welding

Neural networks for materials design

Composition



Properties

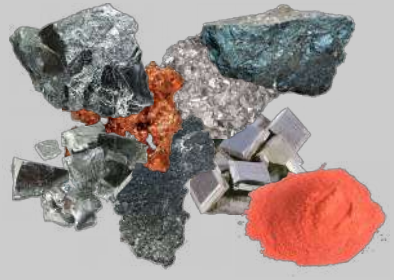
Process

Fatigue

Welding

Neural networks for materials design

Composition



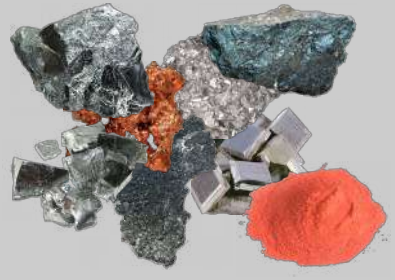
Properties

Process

Fatigue

Welding

Composition



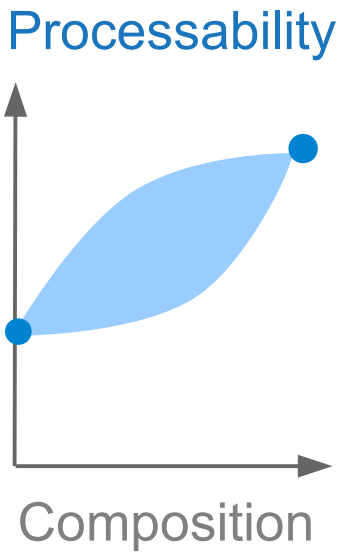
Properties

Process

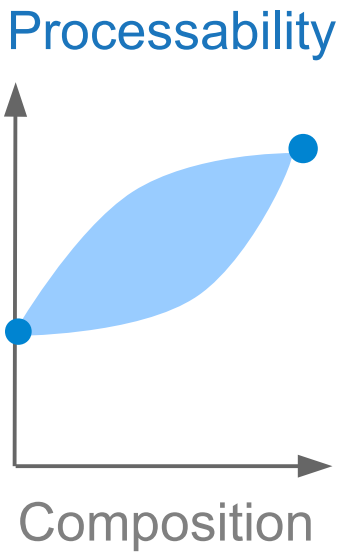
Fatigue

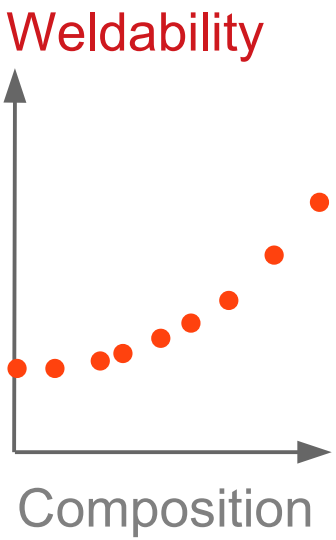
Welding

Insufficient processability results

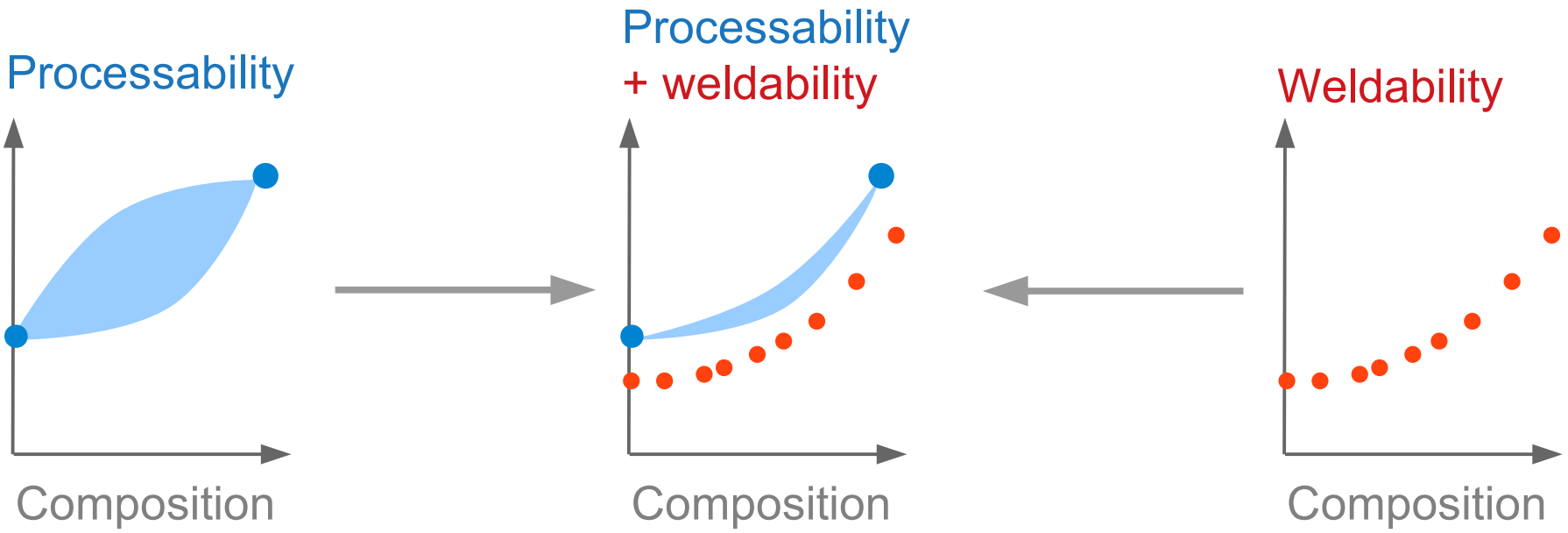


Welding is analogous to direct laser deposition

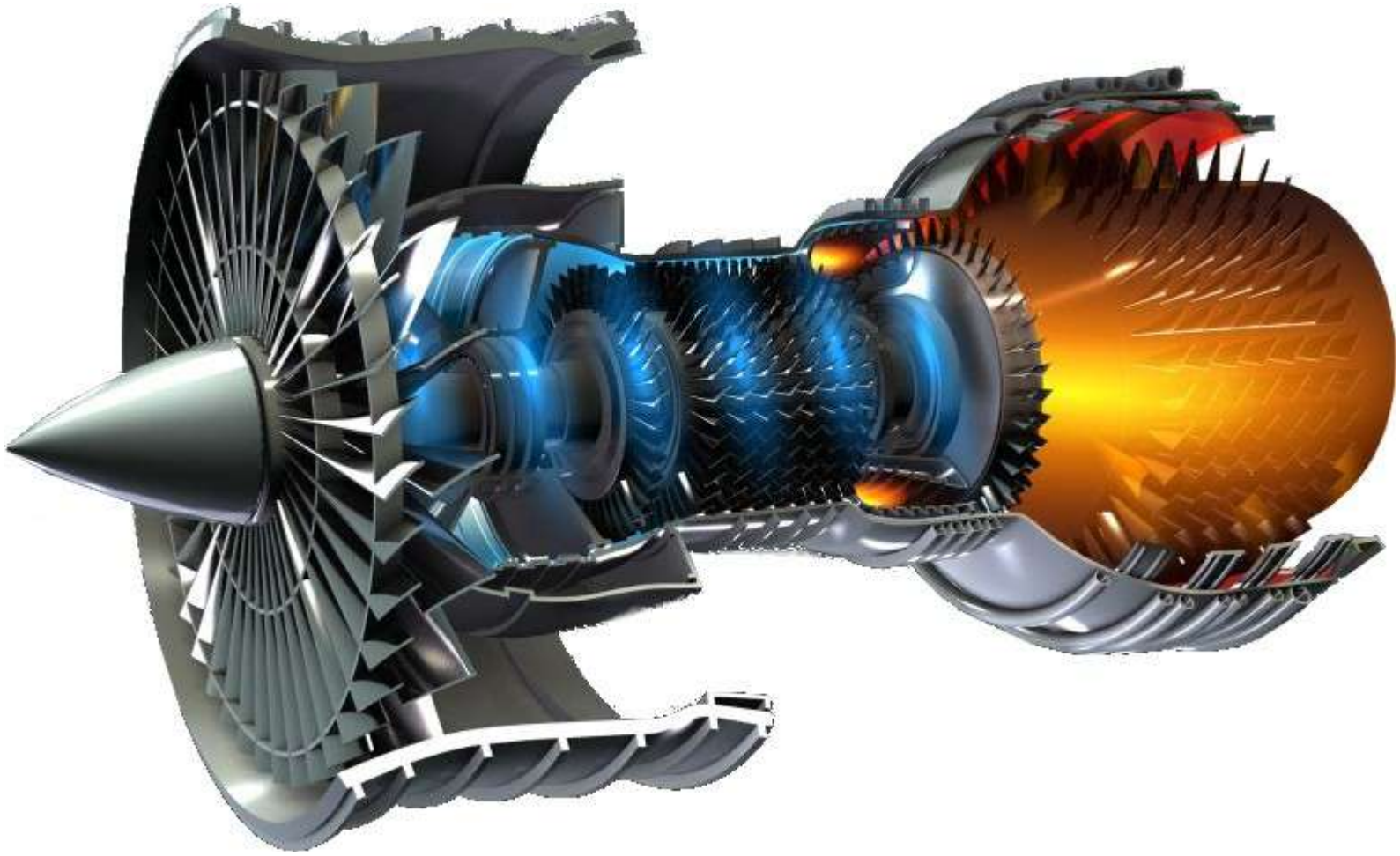




Merging properties with the neural network



Schematic of a jet engine



Composition

Cr: 19%

Co: 4%

Mo: 4.9%

W: 1.2%

Zr: 0.05%

Nb: 3%

Al: 2.9%

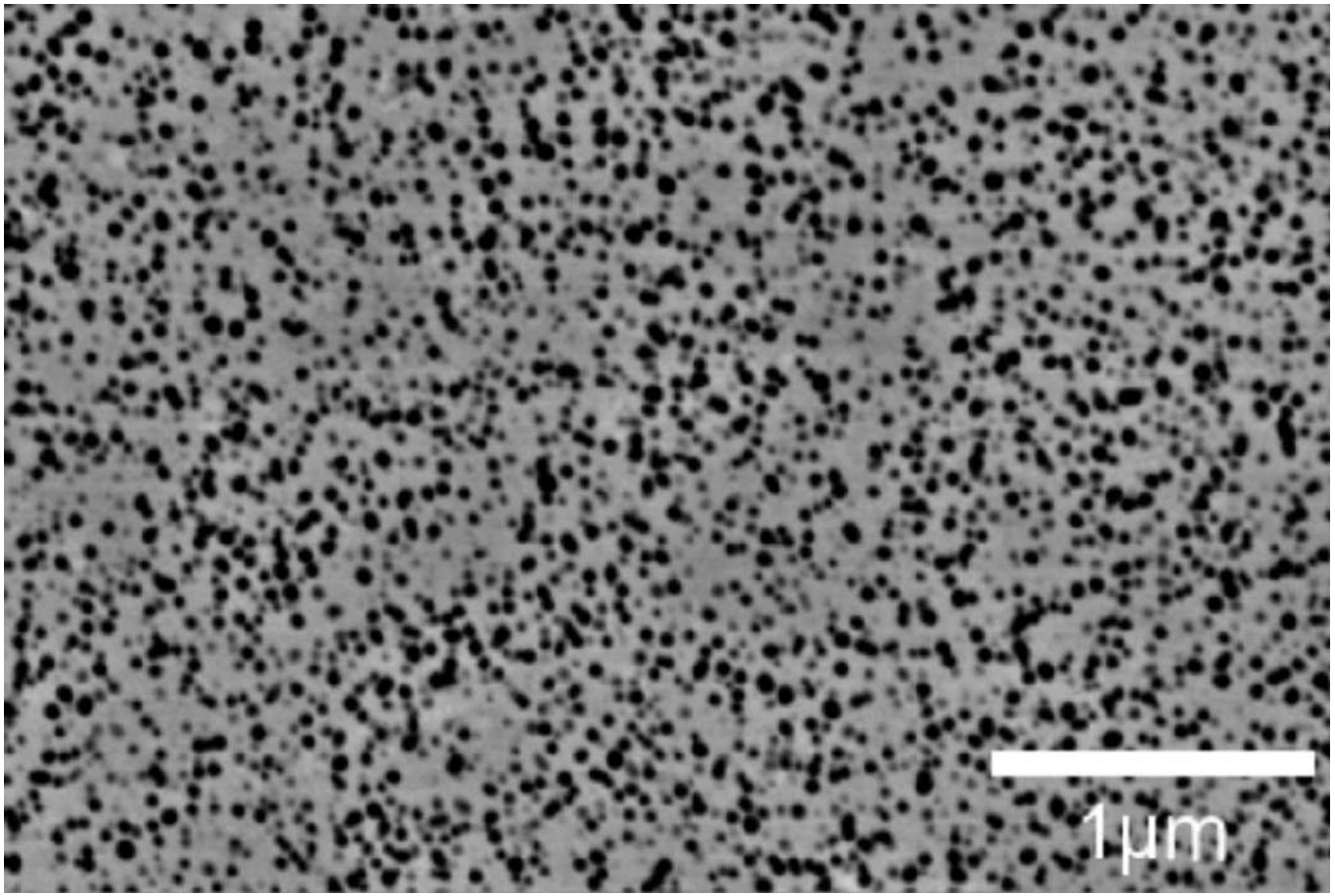
C: 0.04%

B: 0.01%

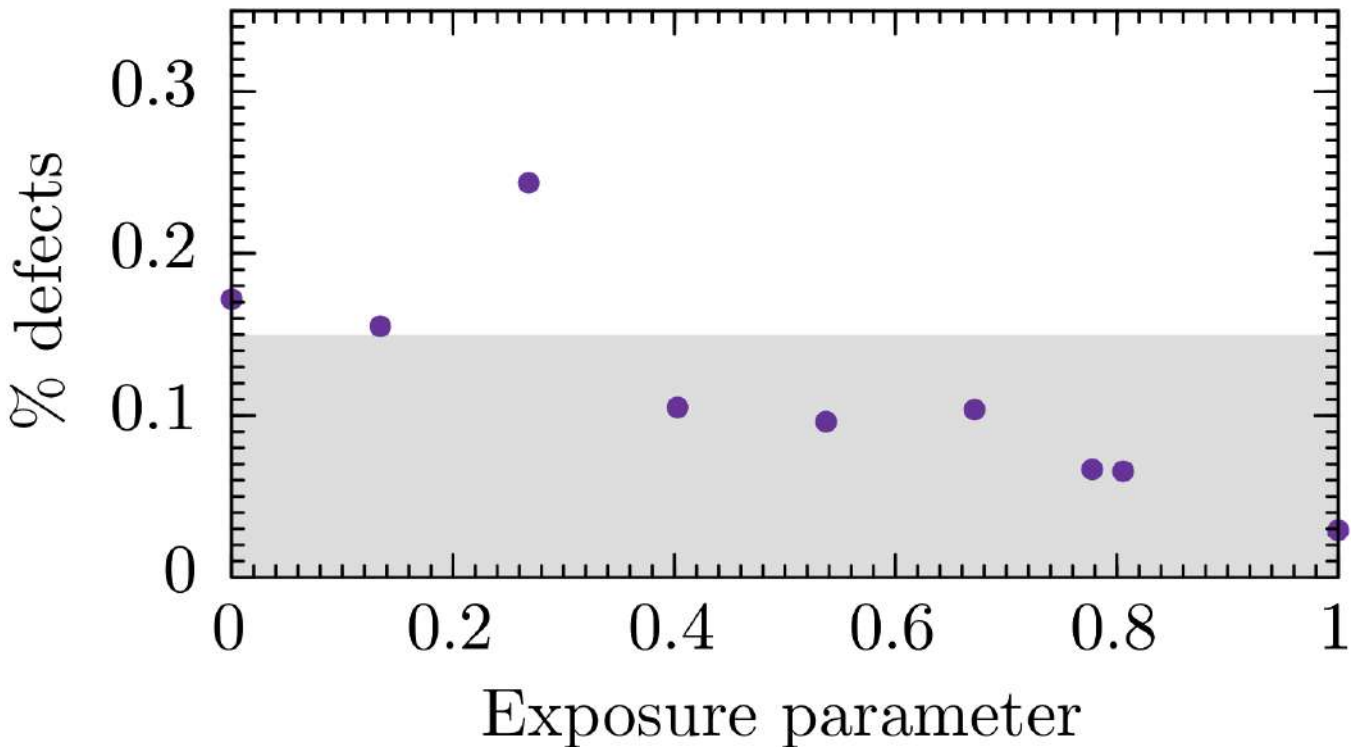
Ni

Expose 0.8

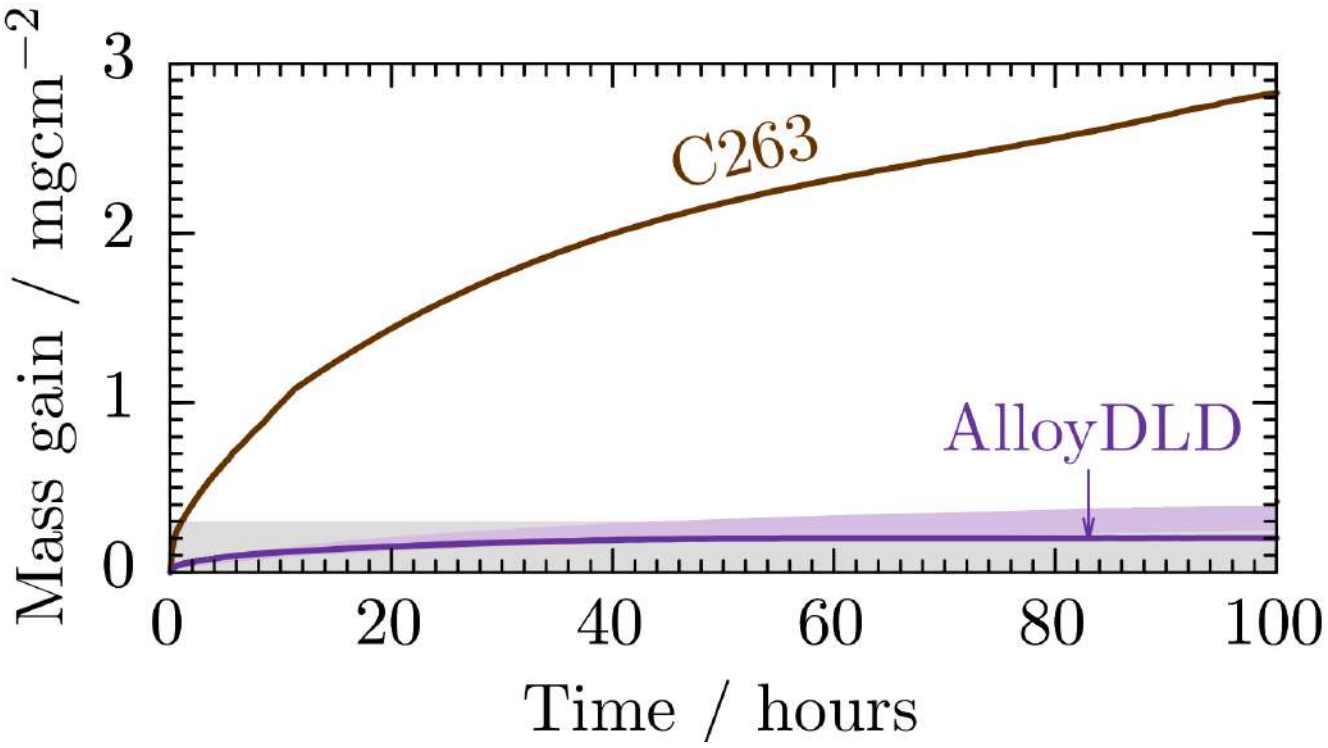
Microstructure



Testing the processability: horizontal printing



Testing the oxidation resistance



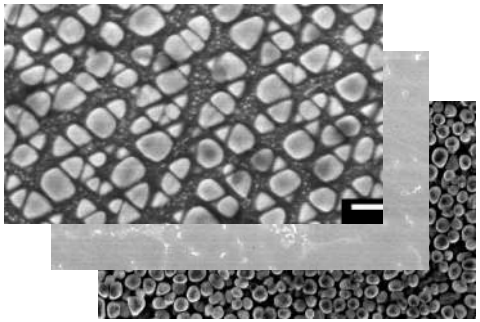
Printing components for an engine

Materials Solutions

ROLLS ROYCE

Materials designed

Nickel and molybdenum



Experiment and DFT for batteries

bp

GRANTA
MATERIAL INSPIRATION

Lake Shore
CRYOTRONICS

e-therapeutics

Summary

Merge different experimental quantities and computer simulations into a holistic design tool

Designed and experimentally verified alloy for direct laser deposition

Further experimentally proven materials, founded start-up intellegens.ai