UNIVERSITY OF CAMBRIDGE

intellegens

# Machine learning for sparse data

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# Alchemite™ machine learning for sparse data

Typical experimental data is sparse but Alchemite™ extracts more information than other machine learning approaches

Design optimal industrial formulations

Accelerate the research & development processes from 10 to 1 years

Reduce costs from $20 million to $1 million

# Problem statement from GKN

GKN seek a heat exchanger to serve as a structural component in an aircraft and is additive manufactured

Intellegens will design the titanium alloy composition with high thermal conductivity without reducing the mechanical properties

# Alchemite™ machine learning

Al

V

Fe

C

N

O


0.2% YS

UTS

Area reduction

log(Cyclic life)

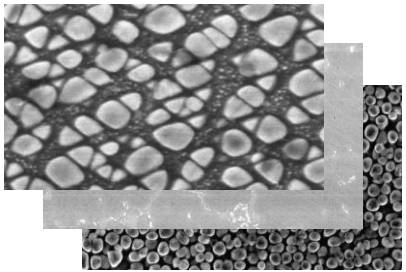
Conductivity

# Optimized alloy

| | | |
|---|---|---|
| Al |  | 6.49% |
| V |  | 3.99% |
| Fe |  | 0.19% |
| C |  | 0.01% |
| N |   | 0.04% |
| O |  | 0.17% |

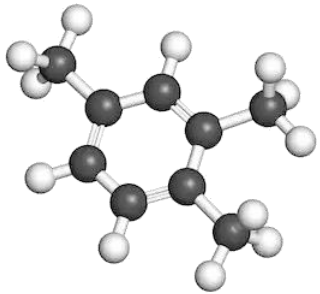
| | |
|---|---|
| 0.2% YS /MPa | 844 |
| UTS /MPa | 953 |
| Area reduction /% | 32.9 |
| log(Cyclic life) | 4.52 |
| Conductivity /$Wm^{-1}K^{-1}$ | 6.59 |

# Other sparse data design projects



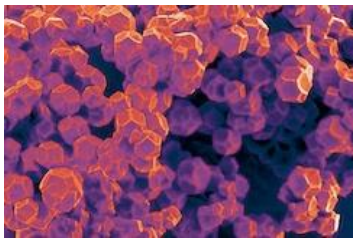
Nickel and moly alloys


Batteries



Lubricants

Steel for welding



Metal-organic framework

Concrete

Steel for turbos

Drug design

# Further applications in the ATI-Boeing accelerator

## Aerospace applications

Alloys for additive manufacturing
Battery materials
High temperature alloys for engines
Composite materials
Advanced lubricants and fuels

## Sparse data applications - post COVID-19

Prediction of future infection rates (with InnovateUK & Richard Nixon Foundation)
Effective and focused passenger screening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