

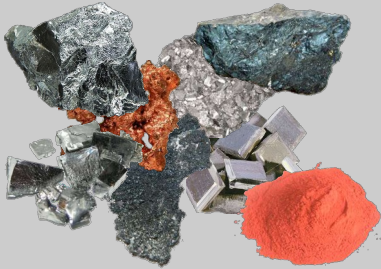
Materials discovery with artificial intelligence

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Neural networks for materials design

Composition



Artificial
intelligence

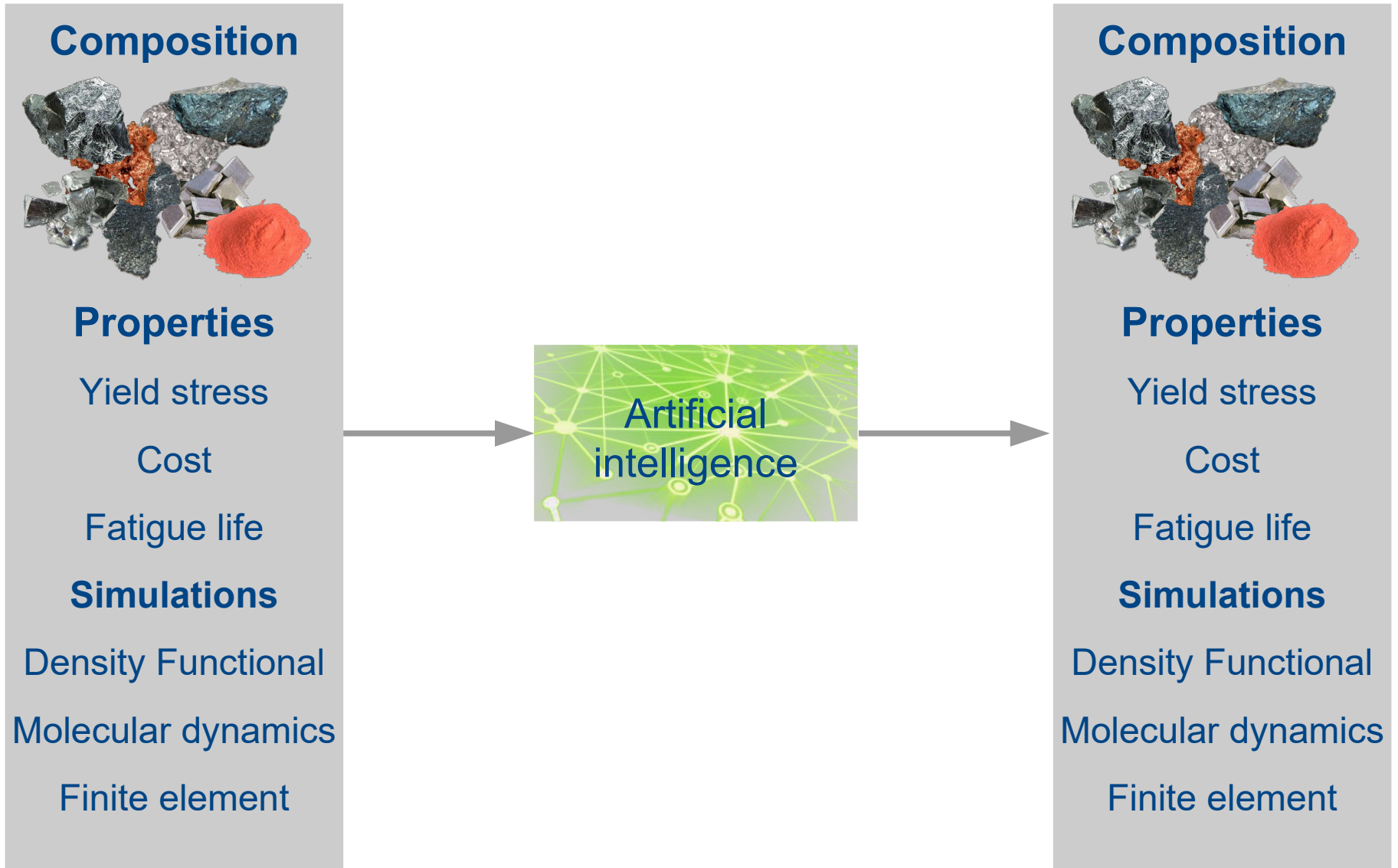
Properties

Yield stress

Cost

Fatigue life

Neural networks for materials design

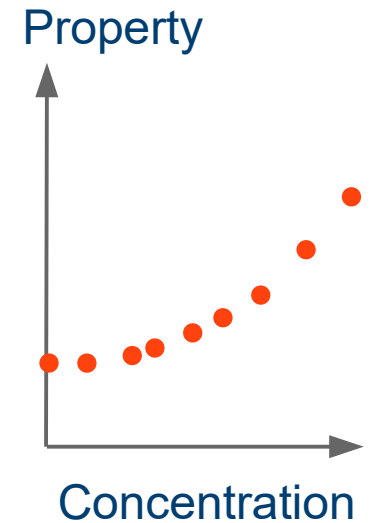
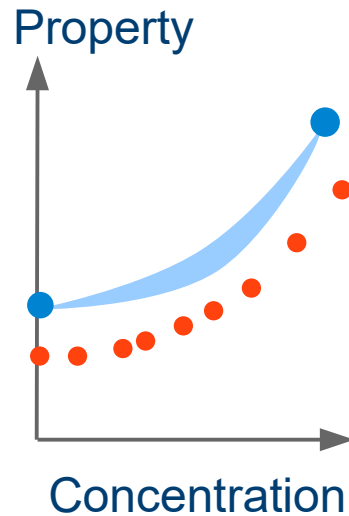
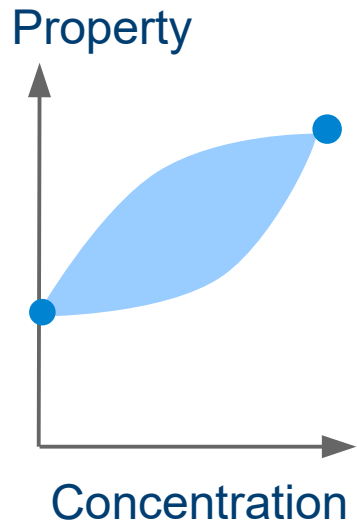


Neural networks for materials design

Experiment

Combined

Simulation

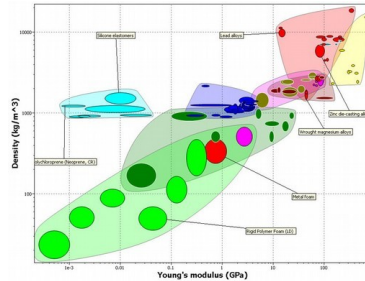


Materials design

Experimental



Experimental



Structural and experimental



Materials design

DFT and experimental



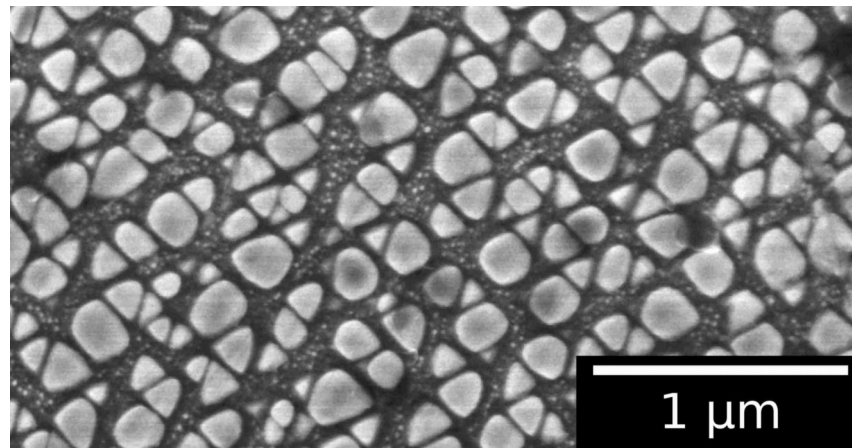
DFT and experimental



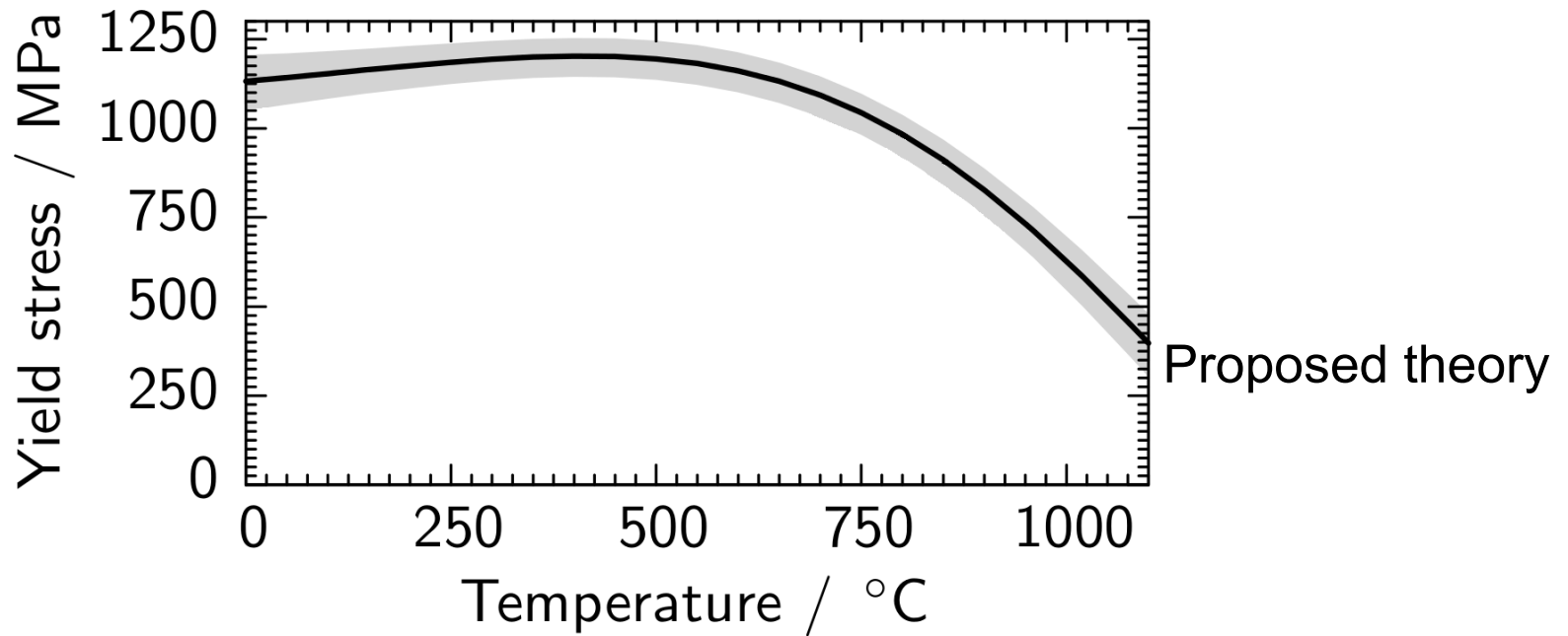
Quantum mechanics
and experimental



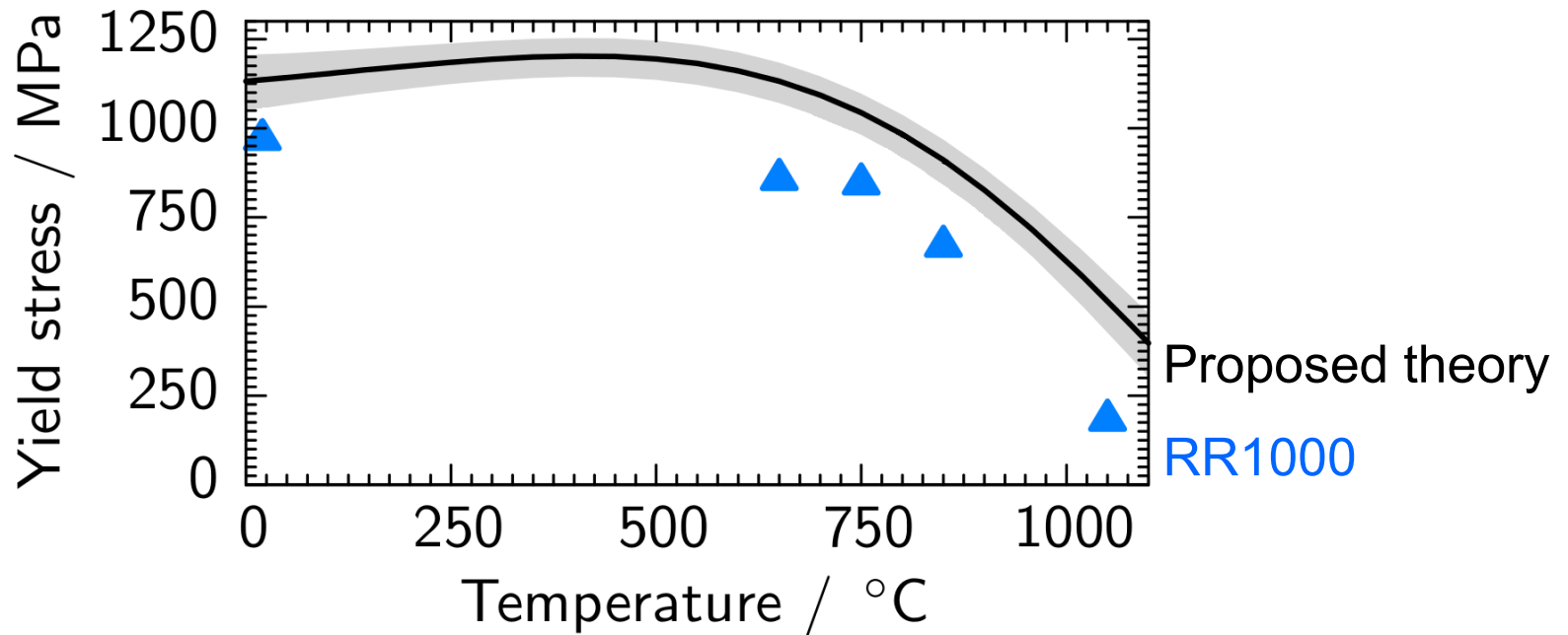
Microstructure



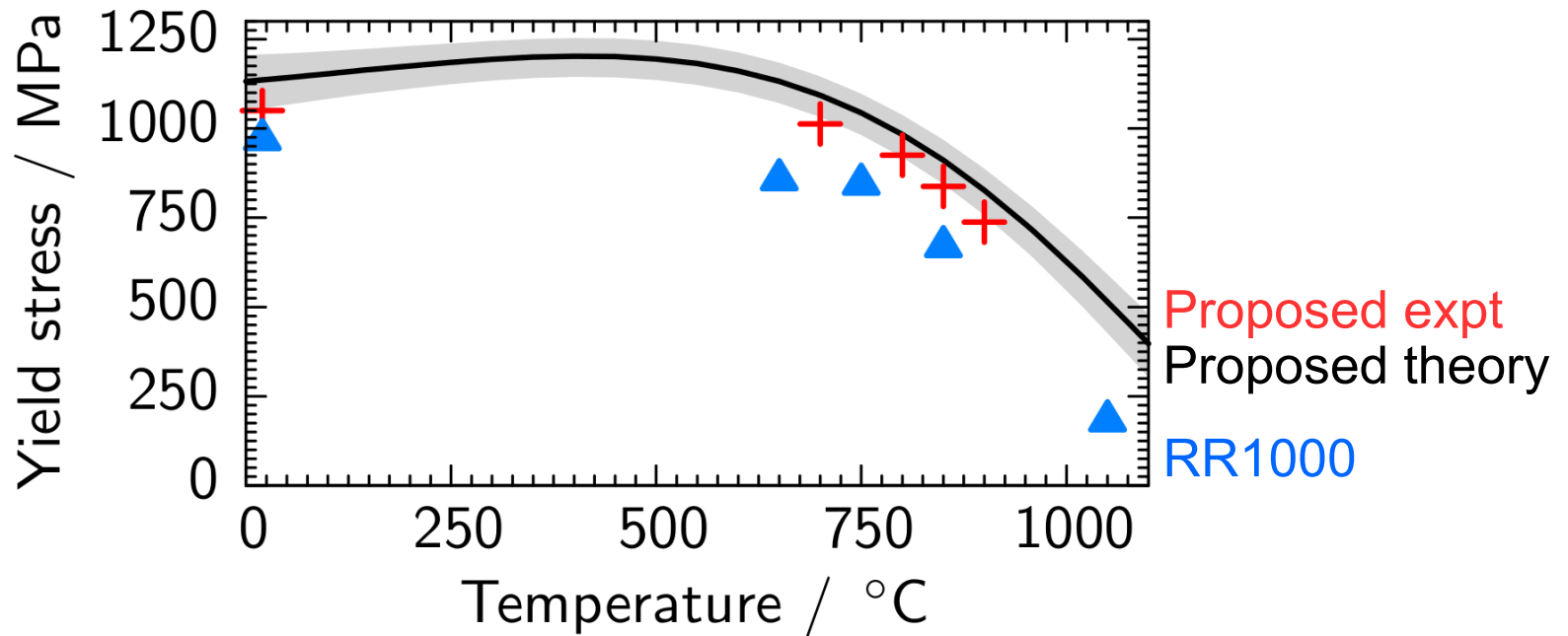
Testing the yield stress



Testing the yield stress



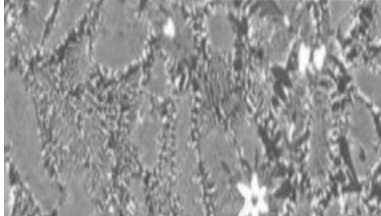
Testing the yield stress



Alloys discovered

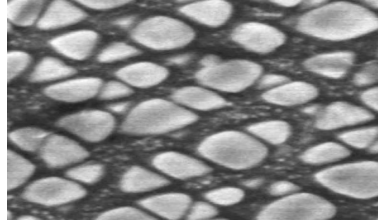
Cr-Cr₂Ta alloys

Intermetallics, 48, 62



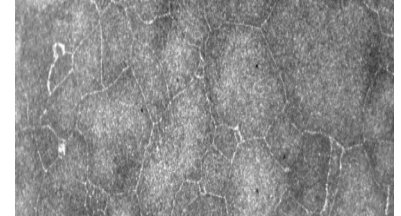
Combustor alloy

GB1408536



RR1000 grain growth

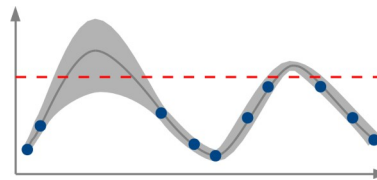
Acta Materialia, 61, 3378



Discovery algorithm

EP14153898

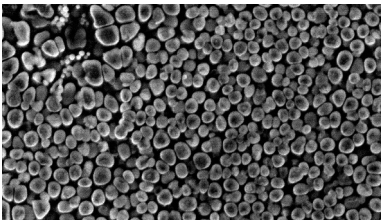
US 2014/177578



Ni disc alloy

EP14157622

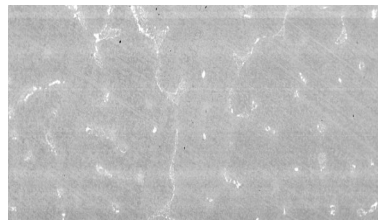
US 2013/0052077 A2



Mo-Hf forging alloy

EP14161255

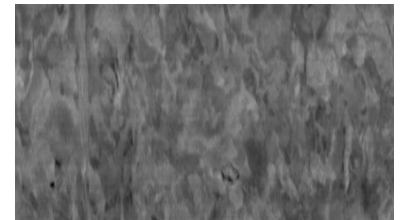
US 2014/223465



Mo-Nb forging alloy

EP14161529

US 2014/224885



Summary

Used artificial intelligence to discover materials

Handle fragmented data

Merge experiments and simulations into holistic design tool

Proposed four new alloys, experimentally verified

Worked with six different companies,
formed startup intellegens