

How the UK can lead the materials sector with AI and robotics

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UNIVERSITY OF
LIVERPOOL

MATERIALS
INNOVATION
FACTORY

Leverhulme Research
Centre for Functional
Materials Design



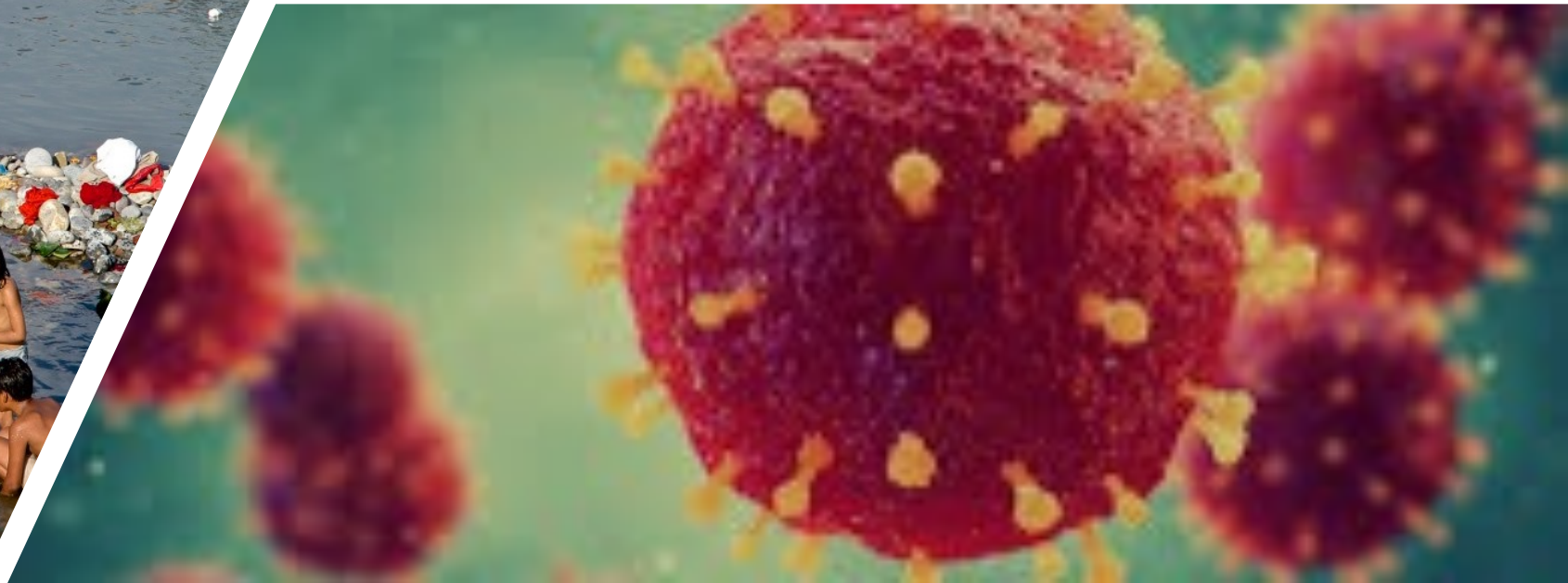
Alchemy
AI FOR CHEMISTRY



Engineering and
Physical Sciences
Research Council



Our world is
changing





Research must
keep pace!

nature

ROBO CHEMIST

An autonomous
approach to
experimental
chemistry

Seeing red
Three nations prepare
to launch their
missions to Mars

Rock weathering
A potential route to
large-scale removal
of atmospheric CO₂

Coronavirus
Human antibody
blocks infection
by SARS-CoV-2

Vol. 585, No. 7815
nature.com

- Autonomous & mobile
- Thinks in 10 dimensions
- Did a 'PhD in a week'

Article

A mobile robotic chemist

<https://doi.org/10.1038/s41586-020-2442-2>

Received: 1 November 2019

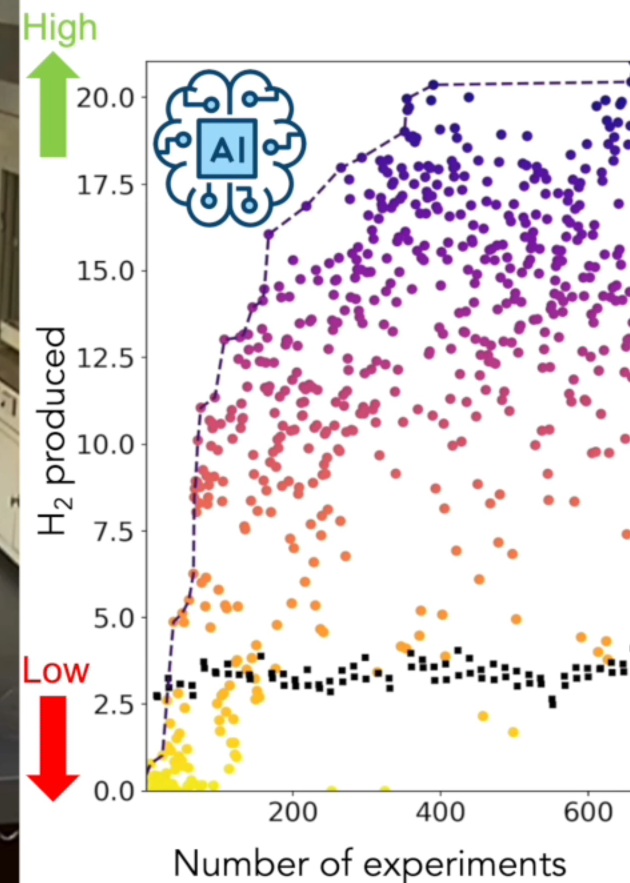
Accepted: 25 March 2020

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04-21-2019 Sun 19:10:22

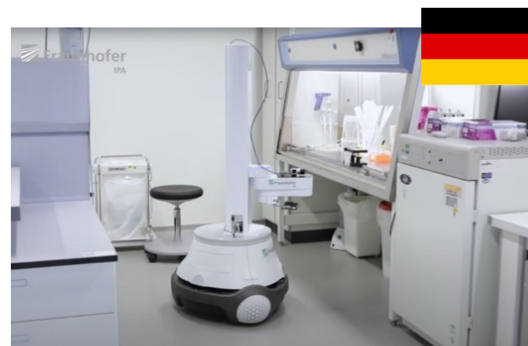
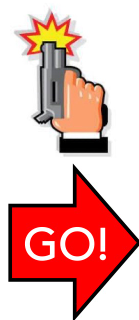
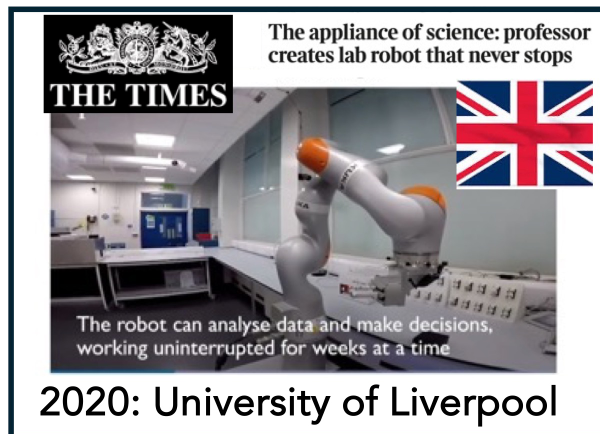


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Works 24/7, 200 x faster, thinks for itself using AI

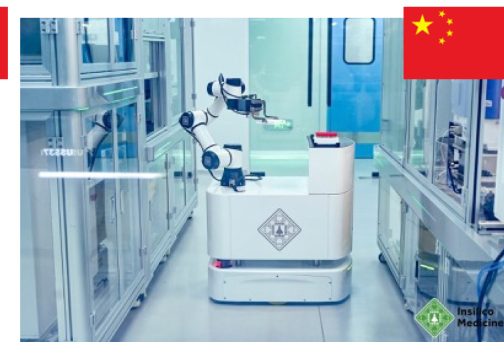
Starting a Robot Revolution



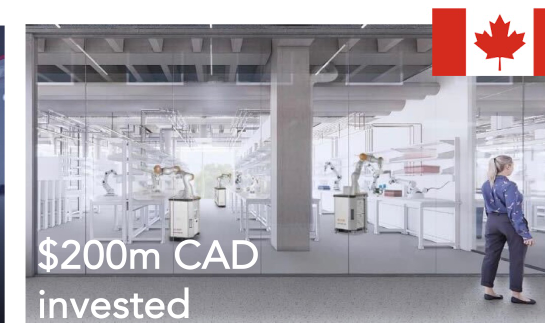
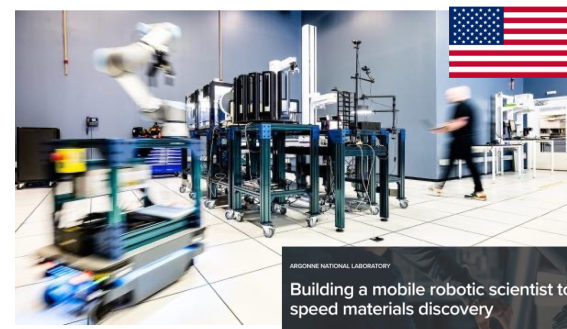
2020/21: Fraunhofer IPA



2022 (?): Xtal Pi, Shanghai



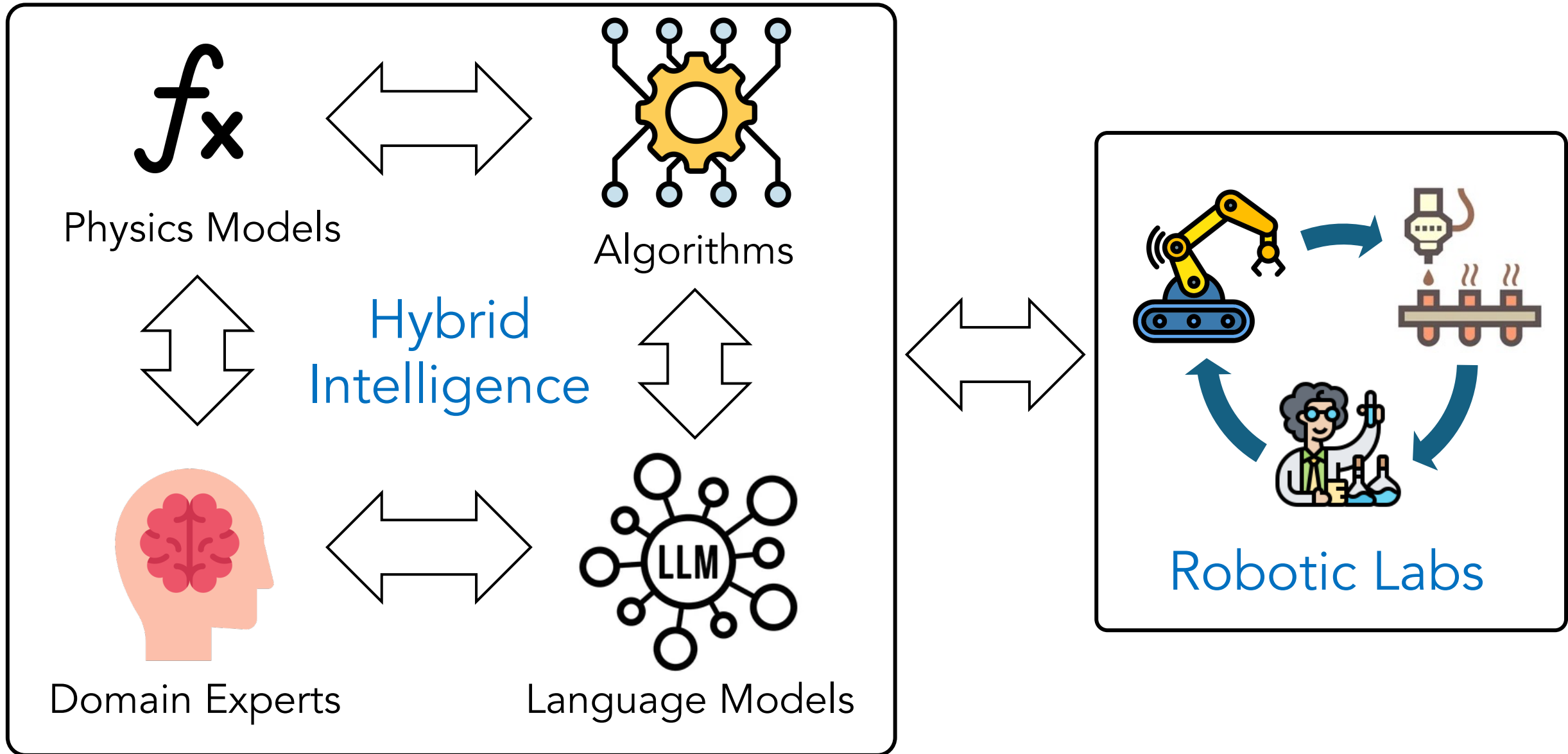
2022 (?): Insilico Medicine



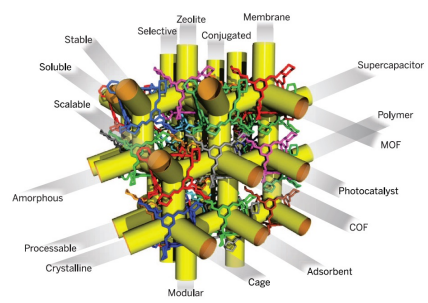
Implications for UK

- Basic AI tools will be ubiquitous
- 'Follow-up' R&D will become faster
- Primacy of UK knowledge leadership

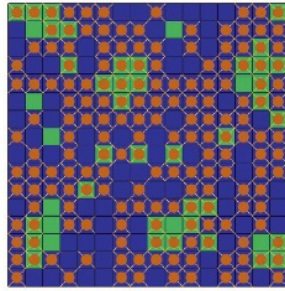
Future Strategy for UK R&D



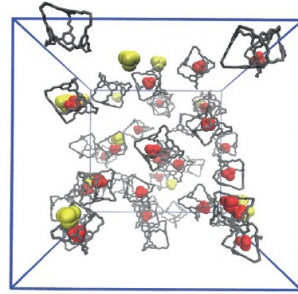
Digital Materials Research in Liverpool



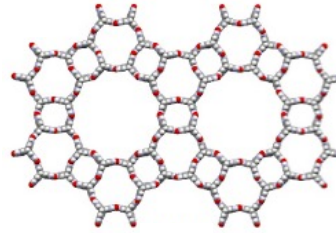
Science, 2015



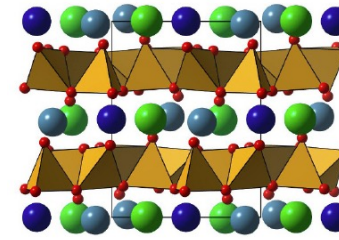
Nature, 2015



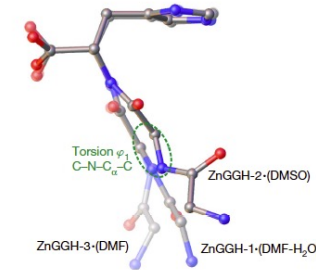
Nature, 2015



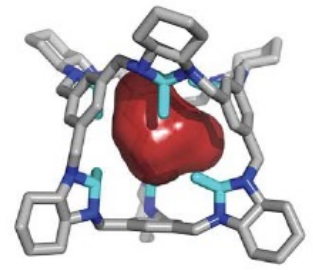
Nature, 2017



Nature, 2017



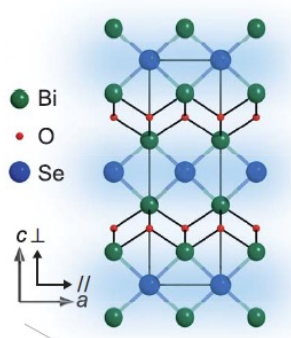
Nature, 2019



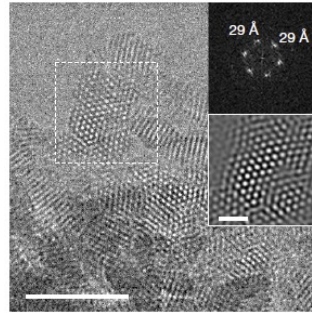
Science, 2019



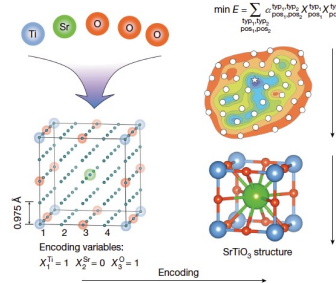
Nature, 2020



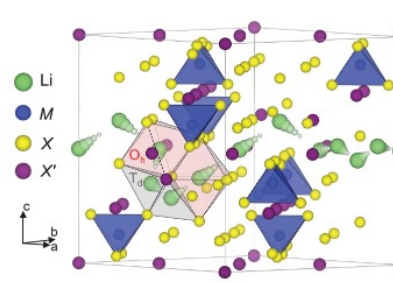
Science, 2021



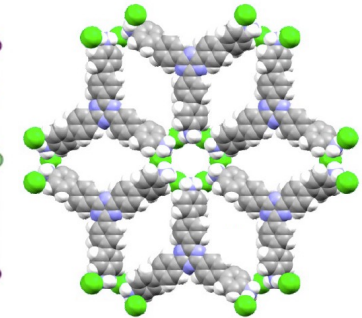
Nature, 2022



Nature, 2023



Science, 2024



Nature, 2025



Nature, 2025

Leading digital chemistry for >10 years

EPSRC

Engineering and Physical Sciences
Research Council



**LEVERHULME
TRUST**

The Materials Innovation Factory



- Opened in 2017
- World's leading centre for AI & robotics in materials chemistry R&D
- 100 industrial and 200 academic researchers