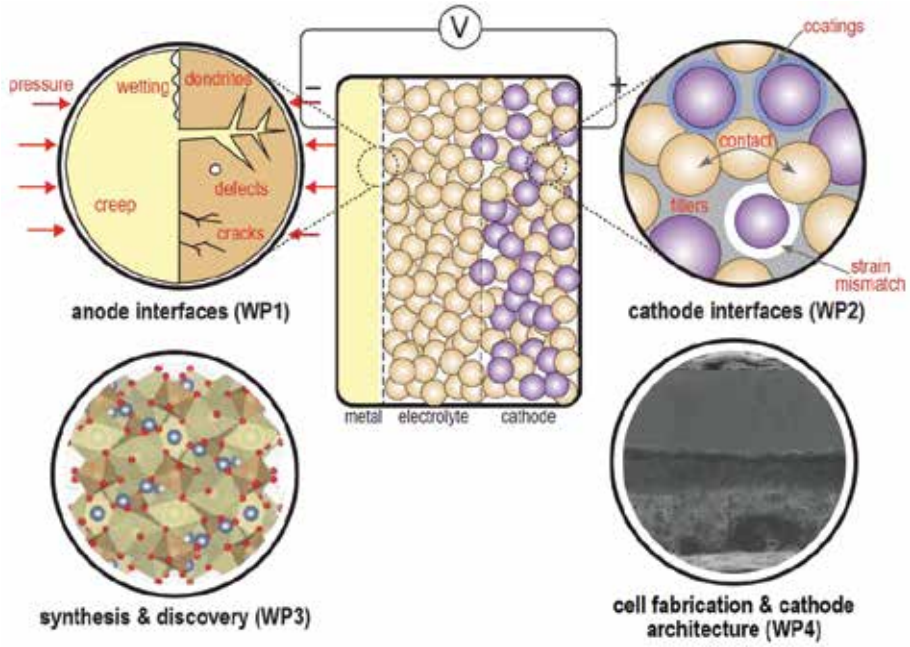
NEXT GENERATION SOLID-STATE BATTERIES (SOLBAT)

The University of Oxford is leading an effort with five other university partners and nine industrial partners to break down the barriers that are preventing the progression to market of solid-state batteries, that should be lighter and safer, meaning cost savings and less reliance on cooling systems.



The ambition of this project is to understand the key chemical and fabrication challenges that would be inherent in the integration of batteries with a chemistry beyond Li-ion. With Oxford, university partners will include the University of Liverpool, University of Sheffield, University of Cambridge, University College London, and the University of St. Andrews.

An all-solid-state battery would revolutionise the electric vehicles of the future.

The successful implementation of an alkali metal negative electrode and the replacement of the flammable organic liquid electrolytes, currently used in Li-ion batteries, with a solid would increase the range of the battery and address the safety concerns. Current efforts to commercialise such batteries worldwide are failing and will continue to fail until we understand the fundamental processes taking place in these devices. We have identified the four major barriers facing all-solid-state batteries where a lack of fundamental understanding is blocking progress.

They are reflected in the four work packages (WP) of our programme:

- *WP1: Plating and stripping Li or Na at the alkali metal anode||solid electrolyte interface.*
- *WP2: Ceramic-ceramic contact at the solid electrolyte||cathode interface.*
- *WP3: Discovery of new solid electrolytes.*
- *WP4: Investigation of solid-state electrolytes in full cell architectures.*

Through fundamental knowledge developed in our project our partners will be guaranteed a competitive edge in making informed decisions and providing a new generation of top notch battery scientists. Along the way, new intellectual property will be developed and ideally converted into viable businesses by industrial partners and/or newly created start-ups. Ultimately, a serious, long-term effort in developing a strong and substantial core knowledge will result in either the development of the battery chemistry of the future or will inform the viability of a solid-state battery on a commercial, scalable level.

PRINCIPAL INVESTIGATOR

Professor Peter G Bruce FRS, FRSE,
Department of Materials,
University of Oxford
http://pgbgroup.materials.ox.ac.uk/people/bruce.html

PROJECT LEADER

Professor Mauro Pasta,
Department of Materials,
University of Oxford
http://www.materials.ox.ac.uk/peoplepages/mpasta.html

UNIVERSITY PARTNERS

- University of Oxford (lead)
- University College London
- University of Cambridge
- University of Liverpool
- University of Sheffield
- University of St. Andrews
- And 9 industrial collaborators

www.solbat-faraday.org

THE FARADAY INSTITUTION

EPSRC Engineering and Physical Sciences Research Council

INDUSTRIAL STRATEGY