FINAL PROGRAMME

IUTAM Symposium on Chemo-Mechanics

Oxford, June 29 - July 2, 2025

June 29 Sunday	June 30 Monday	July 1 Tuesday	July 2 Wednesday
	08:30 – 09:00 Welcome		
	09:00 – 10:30 Session 1: Batteries I	09:00 – 10:30 Session 5: Batteries III	09:00 – 10:30 Session 9: Batteries IV
	10:30 – 11:15 Coffee Break & Posters		
	11:15 – 12:45 Session 2: Failure mechanisms I	11:15 – 12:45 Session 6: Corrosion	11:15 – 12:45 Session 10: Hydrogen III
	12:45 – 14:00 Lunch Break		
	14:00 – 15:30 Session 3: Hydrogen I	14:00 – 15:30 Session 7: Hydrogen II	14:00 – 15:30 Session 11: Multi-physics modelling
	15:30 – 16:15 Coffee Break & Posters		
	16:15 – 17:45 Session 4: Batteries II	16:15 – 17:45 Session 8: Polymers	16:15 – 18:15 Session 12: Failure mechanisms II
	18:15-19:15 Oxford Tour Visit		18:15 – 18:30 Closing Remarks and Best Poster Award
19:00 – 22:00 Welcome Reception	19:30 – 22:00 Rooftop Food & Drinks	18:30 – 19:00 Pre-drinks 19:00 – 22:00 Banquet Dinner	

Day 1 | Monday | June 30 2025

Welcome | 08:30 – 09:00

Session 1 – Batteries I | 09:00 – 10:30 | Chair: Emilio Martinez-Paneda	
09:00 09:30	*Plastic yielding and flow of lithium in a dendrite in a solid electrolyte.* **Robert M. McMeeking**. University of California Santa Barbara, USA.
09:30 10:00	*Chemo-Mechanics of Anode Materials and Interfaces in Solid-State Batteries.* **Matthew T. McDowell**. Georgia Institute of Technology, USA.
10:00 10:30	*Mechanics, heterogeneity, and dynamics of particle network in battery materials.* **Kejie Zhao**. Purdue University, USA.

Coffee break & Posters | 10:30 – 11:15

Session 2 – Failure mechanisms I | 11:15 – 12:45 | Chair: Javier Segurado	
11:15 11:45	*Interfacial failure by surface and bulk diffusion.* **Norman Fleck**. University of Cambridge, UK.
11:45 12:15	*Coupled phase field modelling of electro-chemo-mechanical challenges, lessons learned across battery degradation, corrosion and hydrogen embrittlement.* **Emilio Martinez-Paneda**. University of Oxford, UK
12:15 12:45	*A numerical-experimental approach to understand the chemo-mechanical degradation of historical oil paintings.* **Emanuela Bosco**. Eindhoven University of Technology, the Netherlands.

Lunch break | 12:45 – 14:00

Session 3 – Hydrogen I | 14:00 – 15:30 | Chair: Gustavo Castelluccio	
14:00 14:30	*Effect of elastic strains on the electrocatalytic activity of intermetallic compounds for the hydrogen evolution reaction.* **Javier LLorca**. IMDEA Materials Institute & Polytechnic University of Madrid, Spain.
14:30 15:00	*Chemomechanical phase-field modeling of microstructural evolution and porosity during hydrogen-based reduction of iron oxides.* **Bob Svendsen**. RWTH Aachen University, Germany.
15:00 15:30	*Hydrides in Zircaloy-4 under thermomechanical cyclic loading: characterisation, experiment and CP modelling.* **Fionn P. Dunne**. Imperial College London, UK.

Coffee break & Posters | 15:30 – 16:15

Session 4 – Batteries II | 16:15 – 17:45 | Chair: Ying Zhao	
16:15 16:45	*Contact loss in all solid-state Li-ion batteries via deposition of impurities.* **Vikram S. Deshpande**. University of Cambridge, UK.
16:45 17:15	*Next Generation Electrochemical Technologies Enabled by Solid-State Electrolytes.* **Jeff Sakamoto**. University of California, Santa Barbara, USA.
17:15 17:45	*The role of crystallography in the chemo-mechanics of battery materials.* **Anton Van der Ven**. University of California Santa Barbara, USA.

Oxford Tour Visit | 18:15 – 19:15

Rooftop Food & Drinks | 19:30 – 22:00

Day 2 | Tuesday | July 1 2025

Session 5 – Batteries III | 09:00 – 10:30 | Chair: Vikram S. Deshpande	
09:00 09:30	*Chemo-Mechano Behaviour of Batteries: From Materials to Cells.* **Paul R. Shearing**. University of Oxford, UK.
09:30 10:00	*Interfacial Mechanics in Solid-State Batteries.* **Neil P. Dasgupta.** University of Michigan, USA.
10:00 10:30	*Coupled Stress and Electrochemical Effects in Garnet-Type Solid Electrolytes.* **X. Wendy Gu**. Stanford University, USA.

Coffee break & Posters | 10:30 – 11:15

Session 6 - Corrosion | 11:15 – 12:45 | Chair: Zachary D. Harris	
11:15 11:45	*Predicting maritime structural corrosion with a hybrid mechano-electrochemical model.* **Julian A Wharton**. University of Southampton, UK.
11:45 12:15	*Slip band and oxidation interactions in crack initiation and growth mechanisms in nickel base superalloys.* **Philipa Reed.** University of Southampton, UK.
12:15 12:45	*Multi-ionic reactive transport modeling of pitting corrosion and electrodialysis.* **Ravindra Duddu**. Vanderbilt University, USA.

Lunch break | 12:45 – 14:00

Session 7 – Hydrogen II | 14:00 – 15:30 | Chair: Livia Cupertino-Malheiros	
14:00 14:30	*Multiscale modelling of hydrogen diffusion in iron considering the effect of dislocations.* **Javier Segurado**. Technical University of Madrid, Spain.
14:30 15:00	*Hydrogen-induced damage mechanisms in Ni-based superalloys at elevated temperatures.* **Binhan Sun**. East China University of Science and Technology, China.
15:00 15:30	*Hydrogen embrittlement and fracture of hydrides in zirconium alloys.* ***Hamidreza Abdolvand***. Western University, Canada.

Coffee break & Posters | 15:30 – 16:15

Session 8 – Polymers | 16:15 – 17:45 | Chair: Bjoern Kiefer	
16:15 16:45	*Multiscale Design and Characterization of Biomimetic Hydrogels: Bridging Nature's Hierarchical Structures to Advanced Functional Materials.* **Huajian Gao**. Tsinghua University, China.
16:45 17:15	*Chemo-Mechanics of Biodegradable Polymers.* **Laurence Brassart**. University of Oxford, UK.
17:15 17:45	*Chemo-mechanical modelling of hydrogel-based bioprinting.* **Michele Marino**. University of Rome Tor Vergata, Italy

Conference Banquet | 19:00 – 22:00

Day 3 | Wednesday | July 2 2025

Session 9 – Batteries IV | 09:00 – 10:30 | Chair: Matthew T. McDowell	
09:00 09:30	*Multiscale chemo-mechanical modeling of lithium-ion batteries.* **Ying Zhao**. Tongji University, China.
09:30 10:00	*Electro-chemo-mechanics and architecture in battery materials.* **Giovanna Bucci**. Lawrence Livermore National Laboratory, USA.
10:00 10:30	*Phase-field fracture predictions for composite solid-state battery cathode microstructures.* **Adam M. Boyce**. University College Dublin, Ireland.

Coffee break & Posters | 10:30 – 11:15

Session 10 – Hydrogen III | 11:15 – 12:45 | Chair: Binhan Sun	
11:15 11:45	*Understanding Hydrogen Absorption and Embrittlement of Alloys.* **Livia Cupertino-Malheiros**. Imperial College London, UK.
11:45 12:15	*Effect of Hydrogen on Dislocation Glide.* **Gustavo Castelluccio.** Cranfield University, UK.
12:15 12:45	*On the impact of loading rate on environment-assisted cracking susceptibility of structural metals.* **Zachary D. Harris**. University of Pittsburgh, USA

Lunch break | 12:45 – 14:00

Session 11 – Multi-physics modelling | 14:00 – 15:30 | Chair: Laurence Brassart	
14:00 14:30	*Diffusive molecular dynamics simulation of magnesium hydration.* **Pilar Ariza**. Universidad de Sevilla, Spain.
14:30 15:00	*Modeling the chemo-mechanics of cell motility and blood clotting.* **Alberto Salvadori**. University of Brescia, Italy.
15:00 15:30	*Chemo-mechanical modelling of fracture behaviour in silicon particles during lithiation and delithiation.* **Wei Tan**. Queen Mary University of London, UK.

Coffee break & Posters | 15:30 – 16:15

Session 12 – Failure mechanisms II | 16:15 – 18:15 | Chair: Wei Tan	
16:15 16:45	*In-situ, high-throughput photoelasticity measurements for investigating complex chemo-mechanical phenomena.* **Christos E. Athanasiou**. Georgia Institute of Technology, USA.
16:45 17:15	*Bridging Chemistry and Mechanics in Solids: A Continuum Mechanics-Based Approach.* **Fernando P. Duda**. Federal University of Rio de Janeiro, Brazil.
17:15 17:45	*Transient mechanics – Modelling degradation in deformable electronics.* **Raudel Avila**. Rice University, USA.
17:45 18:15	*Computational chemo-mechanics with application to hydrogels, oxide layer growth, and hydrogen-promoted damage.* **Bjoern Kiefer**. TU Bergakademie Freiberg, Germany.

Closing Remarks and Best Poster Award | 18:15 – 18:30

End of Workshop

List of posters	
P1	*Chemical degradation in rubbery network: discrete and continuum approaches.* **Lucas Mangas Araujo.** University of Oxford.
P2	*Mechanics of polymer chains: from bond deformation to rupture.* **Jie Zhu.** University of Oxford.
P3	*Boron segregation informed hydrogen embrittlement mitigation strategy in a two-phase lightweight steel.* **Xizhen Dong.** Max Planck Institute for Sustainable Materials, Germany.
P4	*Bone-inspired mechanically adaptive materials by coupling stress with material synthesis* **Sung Hoon Kang.** Korea Advanced Institute of Science and Technology, Korea.
P5	*Mechanics of liquid crystal inclusions in soft matrices.* **Yifei Bai.** University of Oxford.
P6	*Fracture mechanics and toughening design of bioinspired composites.* **Kaijin Wu.** University of Science and Technology of China, China.
P7	*Deciphering the interplay between wetting and chemo-mechanical fracture in α-V_2O_5 single-crystal positive electrode materials.* **Wan-Xin Chen**. TU Darmstadt, Germany.
P8	*Chemo-mechanical interactions in aerospace smart materials: effects on structural integrity and flutter suppression.* **Kotaru Sudha Deepthi.** Dayananda Sagar University, India.
P9	*Chemomechanical phase-field modelling of microstructural evolution and porosity during hydrogen-based reduction of iron oxides.* **Kartik Umate.** Max Planck Institute for Sustainable Materials, Germany.
P10	*Towards intelligent design of resorbable magnesium alloys: a machine learning perspective.* **Vickey Nandal.** Czech Academy of Sciences, Czech Republic.
P11	*Static and dynamic thermos-mechanical phase field modelling of fracture in functionally graded materials.* **Raghu Piska.** Birla Institute of Technology and Science Pilani Hyderabad campus, India.

P12	*The effect of hydrogen on the fracture toughness of the heat-affected zone of vintage and modern pipeline steels.* **Dannisa R. Chalfoun.** University of Oxford, UK
P13	*Phase-field-based chemo-mechanical modelling of corrosion-induced cracking in reinforced concrete.* **Evzen Korec.** University of Oxford, UK.
P14	*A computational framework for predicting the effect of surface roughness in fatigue.* **Sara Jimenez-Alfaro.** University of Oxford, UK.
P15	*Understanding the oxidation behaviour of pure Tungsten in dry air.* **Rongrui Li.** University of Oxford, UK.
P16	*Computational prediction of failure by denting in hydrogen-charged X65 Pipe.* **Ratul Das.** University of Oxford, UK.
P17	*Hydrogen embrittlement re-understood: unravelling the role of hydrogen on plasticity.* **Alfredo Zafra.** University of Oxford, UK.
P18	*A computational study of electrolyte behaviour and reaction kinetics in cracked cathode particles.* **Sebastian Luza Vega.** University of Oxford, UK.
P19	*A neural network machine-learning approach for characterising hydrogen trapping parameters from TDS experiments.* **Nicoletta Marrani.** University of Oxford, UK.
P20	*Development of a hybrid high-entropy alloy/steel to mitigate hydrogen embrittlement.* **Lorea Armendariz.** University of Oxford, UK.
P21	*Prediction of cracking and capacity fade of lithium-ion battery electrode particles.* **Yang Tu**. University of Oxford, UK.
P22	*Modeling oxide layer formation in ceramic metal melt filters via phase-field simulations incorporating reaction-diffusion processes.* **Stephan Roth.** TU Bergakademie Freiberg, Germany.
P23	*Crystal plasticity influence on dissolution-driven stress corrosion cracking.* **Maciej Makuch.** Imperial College London, UK.
P24	*Diffuse interface formulations for chemo-mechanically induced degradation: Applications to corrosion and biocorrosion.* **Sasa Kovacevic.** University of Oxford, UK.