KEEPING UP WITH BATTERIES

We have sifted through >1000 of articles on Li-ion batteries for you! We have captured pretty much everything new and relevant that came out in *September 2018*. We have carefully selected and categorized each article, added some interesting news, and squeezed all this content into our comprehensive review.

Hope it makes your work easier and keeps you in touch with battery literature!

The Research Interfaces Team

ANODE					
Advanced electrodes, separators, and electrolytes for Li-ion batteries	RSC				
Determining electrode tortuosity based on diffusivity vs conductivity	ECS				
Examining water-based binders and their effect on graphite SEI	ACS		G		
Modeling effect of SEI properties on degradation of graphite	ECS		G		
Understanding graphite phase transition from LiC_{12} to LiC_6	ACS		G		
Quantifying anode changes in aged NMC532/graphite pouch cell	ECS		G		
Laser-fabricated porous electrodes for improved rate performance	Elsevier		G		
★Understanding failure of PVDF binder in Si–graphite anode	ACS		Si-G		★
Synthesizing water-soluble PAL–NaPAA binder for micro-Si anode	ACS		Si		
Examining nanoporous ZnO matrix for Si composite anode	ACS		Si		
Simulating diffusion of Li atoms in Si anode using Monte Carlo	AIP		Si		
Studying nucleation and growth of Li–Si alloys on Si surfaces	Wiley		Si		
Co-depositing Ti and Si for improved stability of Si thin-film anode	Wiley		Si		
Mixing Si composite slurry using ZrO_2 balls	Elsevier		Si		
★Interactions between Li dendrites and nanoporous ceramic separators	Elsevier		LiM		★
Localizing Li dendrites in battery separator via EPR imaging	Nature		LiM		
Understanding dendrite–SEI interactions in Li-metal anode	RSC		LiM		
Effect of Li-metal SEI nanostructure on cell performance	Elsevier		LiM		
Studying Li-metal SEI in different electrolytes via XPS and EDX	ACS		LiM		
★Controlling Li nucleation in low $LiPF_6$ concentration electrolyte	Elsevier		LiM		★
Simulating deposition/stripping of Li via continuum mechanics approach	ACS		LiM		
Effects of T and pressure on stability and kinetics of Li/polymer interface	ECS		LiM		
Examining Langmuir–Blodgett artificial SEI for Li-metal anode	Nature		LiM		
Examining ionic/electronic conductor interphase for Li-metal anode	Wiley		LiM		
Examining lithio-philic/-phobic gradient interface for Li-metal anode	Nature		LiM		
Examining Nafion/LiCl interface for Li-metal anode	Elsevier		LiM		
Combinatorial analysis of surface coatings on Li-metal anode	ECS		LiM		
Optimizing micro-pattern on Li-metal surface to improve plating/stripping	Elsevier		LiM		

Effect of NMC and LMO cathodes on SEI of $Li_4Ti_5O_{12}$ anode	ECS		LTO		
Examining sodium alginate binder for water-based LTO processing	Elsevier		LTO		
Calculating electrochemical properties of lithiated Co_3O_4 anode	RSC		TMO		
Designing carbon anode with P–O bond	ACS		C		
Reviewing Mo and W chalcogenides for Li-ion batteries	Elsevier				
Reviewing 2D metal carbides and nitrides (MXenes) for Li-ion batteries	Wiley				
Reviewing 2D-pnictogens as anode materials for Li-ion batteries	RSC				
Effect of particle 1D/2D nanostructure on electrode performance	Springer				

LEGEND

— link to the article or website
— OA/review/highlight article
— work led by industry/national lab
— led by prominent company or government/academic research lab

TYPES OF LI-ION BATTERIES

Si, G, LiM, LTO... — anode chemistries
NMC, NCA, LFP... — cathode chemistries
TMO, MPO_4... – transition metal oxide, metal phosphate... chemistries
SSB — solid-state Li-ion battery
SSE, LiPo – solid-state/polymer electrolyte

*Other abbreviations are chemistry or materials specific and commonly used throughout the field (such as chemical elements and formulas). If you are unclear, please click on the link and check.

**Mistakes are unavoidable, so please forgive us if you find any.

ELECTROLYTE

★Structural mechanisms of Li^+ mobility in LiPON electrolytes	ACS		SSE		★
Effect of solid electrolyte properties on Li dendrite growth	ECS		SSE LiM		
Effect of dopants on dendrite formation in LLZO electrolytes	RSC		SSE		
Polymer coating of garnet electrolyte for solid-state cell	Elsevier		SSE LFP/LiM		
Li_xMO_y compounds for compensating Li loss during LLZO sintering	Elsevier		SSE		
Studying Li^+ diffusion in perovskite LLTO electrolyte at 20-100 °C	Elsevier		SSE		
Examining solid halide electrolytes for 4V solid-state cell	Wiley		SSE LCO		
LiF and HFE for improved sulfide electrolyte/Li-metal interface	Elsevier		SSE LCO/LiM		
★Analyzing gas evolution in thiophosphate/NMC solid-state cell	ACS		SSE NMC/LTO		★
Effects of T and pressure on stability and kinetics of Li/polymer interface	ECS		LiPo LiM		
Understanding degradation of PEO–LiTFSI-based solid-state cells	RSC		LiPo		
Probing charge distribution in PEO-based electrolyte using KPFM	Elsevier		LiPo		
PMHS–PEO blend polymer electrolyte for solid-state cell	RSC		LiPo LFP/LiM		
PEO–P_{12}FSI-based polymer electrolyte for solid-state cell	ACS		LiPo LFP/LiM		
Architected macroporous polyelectrolyte for Li dendrite suppression	ACS		LiPo LiM		
Dual-crosslinked polymer electrolyte for improved mechanical stability	Wiley		LiPo LFP/LiM		
★Reversible thixotropic gel electrolyte for factor-free cell fabrication	Elsevier		LiPo		★
IL-immobilized P(VDF-HFP) gel electrolyte with self-healing capability	Elsevier		LiPo LFP/LiM		
Silylsulfate-based plastic crystal electrolyte	Wiley		LiPo LCO		
Advanced electrodes, separators, and electrolytes for Li-ion battery	RSC				
$pyr_{1,2F}$TFSI as electrolyte co-solvent for Si-anode cell	Elsevier		Si		

Li_3AlF_6 additive for Li-metal cell	ACS		LFP/LiM		
Diethylenetriamine additive for Li-metal cell	Elsevier		LiM		
$LiNO_3$ additive in carbonate electrolyte for Li-metal cell	Nature		NMC/LiM		
LiBOB additive for improved stability of $LiNi_{0.94}Co_{0.06}O_2$ cathode	Wiley		LNCO/G		
LiBFEP additive for HV $LiNi_{0.5}Mn_{1.5}O_4$/graphite cell	ECS		LNMO/G		
ADN additive for HV $LiNi_{0.5}Mn_{1.5}O_4$ cathode	ACS		LNMO		
bis-TMSA additive for $Li_{1.2}Ni_{0.2}Mn_{0.6}O_2$ cathode	Elsevier		LLO		
FEC additive for NMC622/ and LCO/Si-G pouch cell	ECS		NMC,LCO/Si-G		
Dioxazolone and nitrile sulfite additives for NMC/graphite pouch cell	ECS		NMC/G		
S-based additives for LCO/graphite cell	ECS		LCO/G		
Concentrated LiFSI and LiODFB dual-salt electrolyte	Elsevier		LFP/LiM		
Solvation behavior of $LiBF_4$ and LiTFSI in adiponitrile for HV electrodes	RSC				
Controlling Li nucleation in low $LiPF_6$ concentration electrolyte	Elsevier		LiM		
Quantifying PF_5 and POF_3 from decomposition reactions of $LiPF_6$	ECS				
Quantifying electrolyte changes in aged NMC532/graphite pouch cell	ECS		NMC/G		
Comparing methods for measuring electrolyte transference numbers	ECS				
★Combinatorial screening of electrolytes for Li-metal anode	ECS		LiM		★
🔍Reviewing EC-free electrolytes for HV graphite-based batteries	Springer		G		🔍
Pseudo-concentrated electrolyte for HV battery chemistry	ACS				
Sulfone/EMC-based electrolyte for 5V LNMO/Si pouch cell	Elsevier		LNMO/Si		
Poly(ionic liquid) electrolyte for high T cell operation	ACS		LFP/LiM		
Dissolution behavior of LFP and LCO materials in aqueous solutions	Wiley		H_2O		

NEWS BOX

The World Bank Just Placed a $1 Billion Bet on Batteries (Fortune)

"The World Bank will offer loans up to $1 billion and seek partners for an additional $4 billion to finance batteries in the developing world."

A "Technology-Smart" Battery Policy Strategy for Europe (Science)

"Europe houses less than 1% of the global Li-ion battery cell manufacturing capacity, and this production capability largely addresses niche markets."

Argonne's Joint Center for Energy Storage Research Renewed for 5 Years (Energy.gov)

SEPARATOR

🔍Advanced electrodes, separators, and electrolytes for Li-ion battery	RSC				🔍
★Interactions between Li dendrites and nanoporous ceramic separators	Elsevier		LiM		★

PVDF-HFP/IL separator made by hot pressing	ACS		LFP/LiM		
Octaphenyl-POSS/PMIA composite separator by electrospinning	Elsevier		LCO/LiM		
AlOOH-coated PI separator by electrospinning and blade-coating	Springer		LCO/LiM		
Fluorinated PEEK separator by electrospinning	Elsevier				
PAN micro/nanofiber separator by electrospinning	Elsevier		NMC/LiM		
SiO_2-PAN/PAN-PU dual-layer micro/nanostructured separator	Elsevier		LFP/LiM		
ZnO nanoparticles as filler and foaming agent for gel polymer separator	Elsevier		LFP/LiM		

CATHODE

★Surface and subsurface reactions of TMO cathode materials	Wiley		TMO		★
Studying growth of $Ni_{1/3}Mn_{1/3}Co_{1/3}(OH)_2$ precursor during NMC synthesis	ECS		NMC		
★Investigating mesoscale morphological defects in NMC622 particles	Elsevier		NMC		★
Propagation of NMC phase transition from surface into bulk lattice	ACS		NMC		
Effect of Li silicate coating on crack formation in NMC532 cathode	Elsevier		NMC		
Effect of temperature on O_2 release from NMC622 cathode	ECS		NMC		
$MnPO_4$ coating of NMC622 for improved T and HV stability	Elsevier		NMC		
Dual Li_3VO_4/PPy coating of NMC622 cathode for HV stability	Elsevier		NMC		
LiF coating of NMC532 cathode using $LiPF_6$ precursor	ACS		NMC		
PAA solution coating of Li-rich NMC cathode	RSC		NMC		
Li_4SiO_4 coating of NCA cathode via in-situ hydrolysis	Elsevier		NCA		
Effects of cut-off V and kinetic hindrance in NCA cathode	ECS		NCA		
Gas evolution in thiophosphate/NMC solid-state cell	ACS		NMC (SSB)		
Advanced electrodes, separators, and electrolytes for Li-ion battery	RSC				
Benchmarking structure and properties of Li_xNiO_2 cathodes (for $0 \le x \le 1$)	ECS		LNO		
★Investigating O_2 release and surface degradation in Li-rich cathodes	ECS		LLO		★
Simulating first cycle for Li-rich $xLi_2MnO_3 \cdot (1\text{-}x)LiMO_2$ cathode	ECS		LLO		
Synthesizing $Li_{1.2}Mn_{0.6}Ni_{0.2}O_2$ with bicontinuous ion/electron pathways	Elsevier		LLO		
$LiAlF_4$ coating of $Li_{1.2}Mn_{0.6}Ni_{0.2}O_2$ cathode	ACS		LLO		
Surface modification of $Li_{1.2}Mn_{0.56}Ni_{0.16}Co_{0.08}O_2$ by supercritical CO_2	ECS		LLO		
Understanding degradation in $Li[Li_{1/6}Fe_{1/6}Ni_{1/6}Mn_{1/2}]O_2$	Wiley		LLO		
Decoupling fracture-induced degradation in spinel $Li_xMn_2O_4$ cathode	ECS		LMO		
Monitoring reaction between LMO spinel and Li_2MnO_3 under heat	Elsevier		LMO		
Examining 'zero-strain' $LiCo_xMn_{2-x}O_4$ spinel for stability at high T	ACS		LCMO (SSB)		
Understanding Al_2O_3 ALD growth on $LiMn_2O_4$ cathode	Elsevier		LMO		
Effect of TiO_2 coating on HV performance of $LiCoO_2$ cathode	Elsevier		LCO		
Effect of antiphase boundaries on Li diffusion in LCO cathode	ACS		LCO		
Effect of SEI-generated gases on cycle life of LMO and LCO cells	ECS		LMO, LCO		
Effect of NMC622 cathode additive on LCO/Si-G pouch cell	ECS		LCO, NMC		
★Impact of surface diffusion on intraparticle phase transformation	Nature		LFP		★
Understanding short-range order in F-doped disordered rocksalt cathode	ACS				

Characterizing $Li_{1+z/3}Ni_{1/2-z/2}Ti_{1/2+z/6}O_2$ disordered rocksalt cathode	Elsevier				
Performance of $LiCoPO_4$ cathode made using aqueous binders	Elsevier		MPO_4		
Fe^{3+} doping of $LiCoPO_4$ for improved HV stability	ACS		MPO_4		
K^+ and Zr^{4+} co-doping of $LiVPO_4F/C$ for improved performance	Elsevier		MPO_4		
Effect of disorder on multi-electron redox in ε-$LiVOPO_4$ cathode	RSC		MPO_4		
Studying in situ chemo-mechanical behavior of V_2O_5 cathode	Elsevier		TMO		
★Analyzing interfacial resistance between cathode and current collector	Elsevier			🔓	★
Determining electrode tortuosity based on diffusivity vs conductivity	ECS			🔓	
Dissolution behavior of LCO and LFP materials in aqueous solutions	Wiley		LCO, LFP		
Laser-fabricated porous electrodes for improved rate performance	Elsevier		LFP		
🔍2D metal carbides and nitrides (MXenes) for Li-ion batteries	Wiley				🔍
Effect of particle 1D/2D nanostructure on electrode performance	Springer				
Economic and environmental evaluation of cathodes for EV batteries	Springer				chapter

NEWS BOX

Mercedes Unveils Electric Car in Direct German Challenge to Tesla (Reuters)

Elon Musk Steps Down as Tesla Chairman in $40 Million SEC Settlement (Time)

States, Cities and Companies Unveil a Frenzy of New Electric Vehicle Commitments (Greentech Media)

DEVICES, FABRICATION & CHARACTERIZATION

★3D printing of complete Li-ion battery using FFF printer	ACS		SSB		★
Designing interlocking component architecture for flexible batteries	Wiley	🎓			
Optimizing parameters of spray-printed battery electrodes	Elsevier				
Laser-fabricated porous electrodes for improved rate performance	Elsevier		G		
Artificial SEI for Li-metal anode made via Langmuir–Blodgett method	Nature		LiM		
Reversible safety switch for overcharging of Si-anode cell	Elsevier		Si		
Fabrication of flexible Ni current collector by inkjet printing	MDPI			🔓	
🔍Nanocomposite materials produced by electrospinning	Elsevier				🔍
🔍Electrospinning of nanofibers and nanocomposites	Elsevier				🔍
🔍Microwave reactors for synthesis of nanomaterials	MDPI			🔓	🔍
🔍★X-ray tomography for battery research and development	Nature				🔍★
Nano-CT visualization of electrodes using contrast-enhancing agent	ACS				
Probing chemical non-uniformities of Li-ion cell via HE-XRD	Elsevier	🏛	*cell* (LCO/G)		

Elemental mapping for electrodes and separators via LA-ICP-MS	Springer				
Localizing Li-metal dendrites in battery separator via CEPRI	Nature		*ano/sep*		
Correlating structure and properties of Li-metal SEI via cryo-EM	Elsevier		*ano* (LiM)		
Studying effect of electrolyte on Li-metal SEI via XPS and SEM-EDX	ACS		*ano/ele*		
Probing electrolyte solvation structure at solid–liquid interface by SERS	ACS		*ele*		
Understanding charge distribution in polymer electrolyte using KPFM	Elsevier		*ele* (LiPo)		
Studying Li^+ diffusion in perovskite LLTO electrolyte using ^7Li NMR	Elsevier		*ele* (SSE)		
Studying degradation in LLO cathode via HAADF-STEM and XPS	Wiley		*ele* (LLO)		
Studying in situ chemo-mechanical behavior of V_2O_5 cathode via DIC	Elsevier		*cat* (TMO)		
Analyzing ELNES in representative Li-ion battery materials	RSC				
Separation of impedance spectra of anode/cathode via 3-electrode cell	Elsevier		*cell* (NMC/G)		
Nonlinear electrochemical impedance spectroscopy of Li-ion cell	ECS		*cell* (NMC/G)		

MODELING & FUNDAMENTALS

★Computational design of materials and interfaces for solid-state cell	Elsevier		*cell* (SSE)		★
Modeling of Li-ion battery aging in different scales	Elsevier		*cell*		
Simulating deposition/stripping of Li metal via continuum mechanics	ACS		*ano* (LiM)		
Simulating diffusion of Li atoms in Si anode via kinetic Monte Carlo	AIP		*ano* (Si)		
First-principle calculation of properties of lithiated Co_3O_4 anode	RSC		*ano* (TMO)		
Simulating first cycle for Li-rich $xLi_2MnO_3 \cdot (1\text{-}x)LiMO_2$ cathode	ECS		*cat* (LLO)		
Modeling electric double layer at electrode–electrolyte interfaces	Elsevier		*ele*		
Structural mechanisms of Li^+ mobility in LiPON electrolytes via MD	ACS		*ele* (SSE)		
Degradation of PEO–LiTFSI-based solid-state cells via DFT	RSC		*ele* (LiPo)		
Fundamental confusion between supercapacitor vs battery storage	Elsevier				
Determining electrode tortuosity based on diffusivity vs conductivity	ECS				
Understanding dendrite–SEI interactions in Li-metal anode	RSC		*ano* (LiM)		
Interactions between Li dendrites and nanoporous ceramic separators	Elsevier		*ano/sep*		
Understanding graphite anode phase transition from LiC_{12} to LiC_6	ACS		*ano* (G)		
Impact of surface diffusion on intraparticle phase transformation	Nature		*cat* (LFP)		
Propagation of NMC phase transition from surface into bulk lattice	ACS		*cat* (NMC)		
Understanding short-range order in F-doped disordered rocksalt cathode	ACS		*cat* (LTMO)		
Comparing methods for measuring electrolyte transference numbers	ECS		*ele*		
★Impact of space-charge layers on performance of all-solid-state cell	ACS		*cell* (SSE)		★
Analyzing ELNES in representative Li-ion battery materials	RSC				

OTHER BATTERY TECHNOLOGIES

Electrochemical engineering: From discovery to product	Wiley		book
Organic small molecules and polymers as Li-ion electrode materials	RSC	Li-ion	
Graphene and CNTs for advanced Li-ion batteries	T&F	Li-ion	book
Inorganic fluorinated carbons in primary Li-ion batteries	RSC	Li-ion	

Graphitic carbon materials for Na-ion batteries	Wiley		Na-ion		
Mixed polyanionic cathode materials for Na-ion batteries	Wiley		Na-ion		
Cathode materials for non-aqueous K-ion batteries	Springer		K-ion		
Electrode materials for rechargeable Zn-ion batteries	ACS		Zn-ion		
Zn dendrite inhibition for Zn-based batteries	Wiley				
Electrolyte and electrode materials for aqueous batteries	Wiley				
Electrically conductive hydrogels for flexible energy storage	Elsevier				
MOF membranes: Production, modification, and applications	Elsevier				
MOF-based materials for Li-S batteries	Elsevier		Li-S		
Selection and structural design of polymers for Li-S batteries	Elsevier		Li-S		
Metal-air batteries: Fundamentals and applications	Wiley		$M-O_2$		book
Sodium superoxide-based $Na-O_2$ batteries	Wiley		$Na-O_2$		
Potassium superoxide as alternative for metal–air batteries	ACS		$K-O_2$		
Chemical energy storage between faradaic and capacitive technologies	RSC		SC		
Design and mechanisms of asymmetric supercapacitors	ACS		SC		
Development, design and applications of structural capacitors	Elsevier		C		

NEWS BOX

Electric Flight Will Transform Our Cities for the Better, and It Will Happen Sooner Than You Think (Greentech Media)

"This trio of storage, sensors and software came together to build today's $6 billion commercial drone industry. Only 10 years ago, it barely existed. Once drones are allowed to fly beyond visual line-of-sight, the market is expected to grow at an even faster pace."

New Electric Drone Has Groundbreaking Flight Time (IEEE Spectrum)

Industry Giants Samsung and Hyundai Invest in Solid-State Batteries (Greentech Media)

Why Lithium-ion May Rule Batteries for a Long Time to Come (MIT Technology Review)

"For anything to make it into a commercial product is a long slog, even if you make the discovery faster. It's just a very long road to materials optimization, testing, customer acceptance, all of these things. To the point that even if I had something that worked perfectly in the lab today, you would probably have a six-to-10-year slog."